Series I. Number III.

BULLETIN

OF THE

University of Notre Dame

NOTRE DAME, INDIANA

ARCHITECTURAL NUMBER

1905 - 1906

PUBLISHED QUARTERLY AT NOTRE DAME

UNIVERSITY PRESS

JANUARY, 1906

Entered at the Postoffice, Notre Dame, Indiana, as second class matter, July 17, 1905.

DIRECTORY OF THE UNIVERSITY.

The FACULTY—Address:

THE UNIVERSITY OF NOTRE DAME,

NOTRE DAME, INDIANA.

The STUDENTS—Address:

As for the faculty, except that the name of the HALL in which the student lives should be added.

A Postoffice, a Telegraph Office, a Long Distance Telephone, and an Express Office are at the University.

The University is two miles from the city of South Bend, Indiana, and about eighty miles east of Chicago. The Lake Shore and Michigan Southern, the Grand Trunk, the Vandalia, the Indiana, Illinois & Iowa, and the Michigan Central railways run directly into South Bend.

CALENDAR FOR 1905-1906.

SEPTEMBER	12.	Examination of Conditioned Students.
	13-14.	Entrance Examination.
	15.	School begins.
	17.	Reading of University Regulations in all the Hal!s.
OCTOBER	13.	Founder's Day.
	27-28.	Bi-Monthly Examinations.
	29.	Annual Retreat begins in the evening.
NOVEMBER	1.	Feast of All Saints.
	30.	Thanksgiving Day.
DECEMBER	5.	Contest in Oratory.
	8.	Feast of the Immaculate Conception.
	18-19.	Winter Examinations.
	19.	Christmas Vacation begins.
JANUARY	5.	School begins.
FEBRUARY	2.	State Oratorical Contest.
	22.	Washington's Birthday.
	23-24.	Bi-Monthly Examinations.
MARCH	17.	St. Patrick's Day.
	19.	St. Joseph's Day.
APRIL	15.	Easter. *No Easter Vacation.*
	16.	Easter Monday.
	24-25.	Bi-Monthly Examinations.
MAY	1.	Latest Date for handing in Prize and Grad uation Essays in all Collegiate Courses.
	16.	Contest in Elocution.
	30.	Decoration Day.
JUNE	4-9.	Examination of Graduates.
	10.	Baccalaureate Sermon.
	11-13.	General Examinations.
	13.	Commencement. Preliminary Exercises 7:30 P. M.
	14.	Graduation Exercises, 8:00 A. M.

BOARD OF TRUSTEES.

VERY REV. JOHN A. ZAHM, C. S. C.,
PRESIDENT.

REV. DANIEL E. HUDSON, C. S. C.

REV. WILLIAM R. CONNOR, C. S. C

REV. ANDREW MORRISSEY, C. S. C.

REV. JAMES J. FRENCH, C. S. C.

BRO. ALBEUS, C. S. C.

EXECUTIVE OFFICERS OF THE UNIVERSITY.

REV. JOHN CAVANAUGH, C. S. C.,
PRESIDENT.

REV. THOMAS A. CRUMLEY, C. S. C.,
VICE-PRESIDENT.

REV. WILLIAM A. MOLONEY, C. S. C.,
DIRECTOR OF STUDIES.

REV. MARTIN REGAN, C. S. C.,
PREFECT OF DISCIPLINE.

REV. WILLIAM MARR, C. S. C.,
PREFECT OF RELIGION.

BRO. PAUL, C. S. C.,
SECRETARY.

DIRECTORS OF HALLS.

HOLY CROSS HALL.

REV. JOSEPH A. MAGUIRE, C. S. C.
REV. JOSEPH J. GALLAGHER, C. S. C.

SORIN HALL.

REV. TIMOTHY MURPHY, C. S. C.
BRO. CELESTINE, C. S. C. MR. W. O'BRIEN, C. S. C.

CORBY HALL.

REV. THOS. H. CORBETT, C. S. C. BRO. LEANDER, C. S. C.
MR. J. McMANUS, C. S. C. MR. S. GAVIN, C. S. C.

BROWNSON HALL.

BRO. HUGH, C. S. C. BRO. AIDAN, C. S. C.
BRO. ALPHONSUS, C. S. C. BRO. JOSEPH, C. S. C.

CARROLL HALL.

BRO JUST, C. S. C.
BRO. VITAL, C. S. C. BRO. GEORGE, C. S. C.

ST. JOSEPH'S HALL.

REV. FRANCIS MOLLOY, C. S. C. BRO. FLORIAN, C. S. C.
BRO. FLORENT, C. S. C.

ST. EDWARD'S HALL.

BRO. CAJETAN, C. S. C. BRO. CYRIL, C. S. C.
BRO. COLEMAN, C. S. C. BRO. ERNEST, C. S. C.

PROFESSORS AND INSTRUCTORS IN THE COLLEGE.

REV. JOHN CAVANAUGH, C. S. C.,
Senior English.

REV. THOMAS A. CRUMLEY, C. S. C.,
Philosophy.

REV. MARTIN REGAN, C. S. C.,
Christian Doctrine.

REV. ALEXANDER KIRSCH, C. S. C.,
Biology.

REV. STANISLAUS FITTE, C. S. C.,
Latin.

REV. JOHN B. SCHEIER, C. S. C.,
Latin and Greek.

REV. JOSEPH MAGUIRE, C. S. C.,
Chemistry and Geology.

REV. MICHAEL M. OSWALD, C. S. C.,
Greek.

REV. MATTHEW SCHUMACHER, C. S. C.
English and History.

REV. JAMES TRAHEY, C. S. C.,
English.

REV. JULIUS NIEUWLAND, C. S. C.,
Chemistry and Botany.

REV. FRANCIS MOLLOY, C. S. C.,
Spanish.

BRO. BASIL, C. S. C.,
Director of the Department of Music.

BRO. GERARD, C. S. C.,
Instrumental Music.

JAMES F. EDWARDS, A. M., LL. B.,
History and Librarian.

WILLIAM HOYNES, A. M., LL D.,
Law.

MARTIN J. McCUE, M. S., C. E.,
Astronomy and Civil Engineering.

DAMIS PAUL,
Piano and Violin.

FRANCIS XAVIER ACKERMANN, M. S.,
Drawing.

JEROME J. GREEN, M. E., E. E.,
Physics and Electrical Engineering.

WILLIAM LOGAN BENITZ, M. E., E. E.
Mechanical Engineering.

EDWARD J. MAURUS, M. S.,
Mathematics.

ROBERT L. GREEN, G. PH.,
Pharmacy and Pharmacognosy.

SHERMAN STEELE, LITT. B., LL. B.,
Law.

CHARLES PETERSEN, A M.,
German.

THOMAS JAMES DEHEY, A. M.,
French.

BENJAMIN R. ENRIQUEZ, C. E.,
Mathematics.

FRANK O'HARA, PH. D.,
History and Political Economy.

ROLLAND ADELSPERGER, A. B.,
Architecture.

CLARENCE J. KENNEDY, B. S.
Anatomy and Physiology.

EDWARD M. SCHWAB, LL. B.,
Law.

FREDERIC KARR,
Elocution and Oratory.

J. LUDWIG FRANK,
Director of the Band.

MILTON B. GRIFFITH,
Vocal Culture.

WILLIAM B. KELLY,
Shopwork.

HENRY F. MAY,
Director of Gymnasium.

INSTRUCTORS IN THE PREPARATORY SCHOOL.

REV. WILLIAM MARR, C. S. C.,
Christian Doctrine.

REV. JOSEPH J. GALLAGHER, C. S. C.,
Latin.

REV. THOMAS H. CORBETT, C. S. C.,
Mathematics.

REV. MICHAEL OSWALD, C. S. C.,
Greek.

REV. MATTHEW SCHUMACHER, C. S. C.,
History.

REV. JAMES TRAHEY, C. S. C.,
Latin.

REV. TIMOTHY MURPHY, C. S. C.,
Christian Doctrine.

BRO. ALEXANDER, C. S. C.,
Mathematics.

BRO. PHILIP NERI, C. S. C.,
Penmanship.

BRO. CYPRIAN, C. S. C.,
Bookkeeping and Commercial Law.

WILLIAM L. BENITZ, M. E., E. E.,
Mathematics.

EDWARD J. MAURUS, M. S.,
Mathematics and Astronomy.

SHERMAN STEELE, LITT. B., LL. B.,
English and Civics.

CHARLES PETERSEN, A. M.,
German.

ALPHAEUS B. REYNOLDS, A. B.,
Latin and English.

WILLIAM J. MAHONEY, A. B., LL. B.,
Mathematics.

JOHN QUINLAN, A. B.,
English.

MICHAEL J. SHEA, A. M.,
Latin and Greek.

THOMAS JAMES DEHEY, A. M.,
French and English.

JOHN B. RENO, A. M., LL. B.,
History and English.

TERENCE B. COSGROVE, A. B.,
Mathematics.

JOHN J. MARONEY,
English.

GALLITZEN A. FARABAUGH, A. B.,
History and English.

CLARENCE J. KENNEDY, B. S.,
Physiology, Zoology and Botany.

HENRY M. KEMPER, LITT. B.,
Latin and English.

ARTHUR S. FUNK,
Chemistry.

MAURUS J. UHRICH,
Physics.

JOHN WORDEN,
Drawing.

UNIVERSITY OF NOTRE DAME.

The University of Notre Dame was founded in the year 1842, by the Very Reverend Edward Sorin, the late Superior General of the Congregation of Holy Cross. In an act approved January 15, 1844, the Legislature of Indiana gave the University power to grant degrees. The beginning of this act is:

"*Be it enacted by the General Assembly of the State of Indiana*, that Edward Frederick Sorin, Francis Lewis Cointet, Theophilus Jerome Marivault, Francis Gouesse, and their associates and successors in office, be, and are hereby constituted and declared to be, a body corporate and politic, by the name and style of the 'University of Notre Dame du Lac,' and by that name shall have perpetual succession, with full power and authority to confer and grant or cause to be conferred and granted, such degrees and diplomas in the liberal arts and sciences, and in law and medicine, as are usually conferred and granted in other universities in the United States, provided, however, that no degree shall be conferred or diplomas granted, except to students who have acquired the same proficiency in the liberal arts and sciences, and in law and medicine, as is customary in other unisities in the United States."

UNIVERSITY BUILDINGS.

THE MAIN BUILDING.

The dimensions of this building are 320 by 155 feet; it is five stories in height and is surmounted by a dome 207 feet in height. The executive offices, two study-halls, some dormitories and class-rooms and the refectories are in this building. The Library and the Bishops' Memorial Hall are also here temporarily. This building, like all others in the University, is lighted by electricity and gas, and heated by steam. The corridors of the first floor are decorated with mural paintings by Gregori.

THE CHURCH.

The Church of the Sacred Heart is 275 by 120 feet in ground dimensions and 125 feet in height from the floor to the roof-ridge. The interior is decorated by Gregori, and the architecture is Gothic. There is a large crypt and many chapels. In the tower are a chime of 32 bells and the great six-ton chief bell.

THE LIBRARY.

The Library contains 55,000 volumes. Students have access to it from 8:00 a. m. to 9:00 p. m.

WASHINGTON HALL.

This hall is 170 feet in length, 100 feet in width, and about 100 feet in height. It contains the rooms of the Department of Music, the reading rooms for Brownson and Carroll Halls, and the University Theatre. The Theatre is elaborately equipped with stage settings. It will seat 1,200 persons.

SCIENCE HALL

is situated a few steps south of Washington Hall. Its dimensions are 104 by 131 feet, and it is three stories in height. A large central space, the full height of the building, is occupied by a museum containing mineral, fossil, and biological specimens.

THE CHEMICAL DEPARTMENT

occupies the entire north side of the first and second floors of Science Hall.

On the second floor, and adjoining the general museum, is a large and well lighted room reserved for a library and chemical museum. Here are a library of chemical journals and books, and a steadily increasing collection of minerals, chemicals, and chemico-technical products of all kinds, designed to serve as illustrations of substances and processes, discussed in the various lecture courses. Adjoining this room are successively, an apparatus room, filled with the most modern apparatus for lecture and experimental work; a chemical storeroom, where laboratory supplies may be procured by the students; a lecture room, and a laboratory for qualitative and quantitative analysis. The laboratory is furnished with hoods, of good draught; the desks are provided with water, gas, and the necessary reagents, and fully equipped with apparatus for work in gas analysis, organic analysis, and with apparatus for "Boiling Point and Freezing Point Determinations." The Balance Room, adjoining, contains assay and analytical balances sensitive to one ten-thousandth of a gramme. The lecture room is provided, among other things, with apparatus for stereopticon illustration, with electric batteries, and with a complete set of charts illustrative of the process employed in modern chemical industries.

The assay and furnace-room, on the first floor, is

equipped with a set of gas furnaces of the most modern type, for the operations of roasting, fusing, scorifying and cupelling employed in the dry assay of ores.

The Department of

PHYSICS AND ELECTRICAL ENGINEERING

is located in the south wing. There is a large lecture room, with a seating capacity of sixty-five students, adjoining the rooms in which the apparatus is stored in dust-proof cases. Several smaller rooms in the basement contain heavy piers of masonry, for work with sensitive galvanometers.

The following is a partial list of the more important pieces of apparatus in the Physical Laboratories:

IN MECHANICS, ETC.:

Large physical balance,
Standard kilogram,
Standard metre,
Geneva cathetometer, capable of measuring to one twenty-five thousandth of an inch,
Dividing engine,
Atwood's machine,
Compound pendulum,
Break circuit recording chronograph,
Powerful hydraulic press with attachments,
Rotary air pumps and receivers,
A large clock with electrical contact pieces,
Self-winding clocks,
Several mercury barometers,
Two aneroid barometers.

IN ACOUSTICS:

A Mercadier radiophone,
Set of Koenig resonators,
Set of electrically-operated tuning forks by Koenig,
A Scott-Koenig Phonautograph,
Edison phonograph of earliest type,
Sets of vibrating rods, tubes and bells,
Large double siren,
Koenig's movable tuning forks, to draw compound curves on smoked glass,
Three sets of organ pipes,
Four sets of fine tuning forks,
Apparatus for manometric observation of sound phenomena,
A large tuning fork producing the lowest audible sound,

A set of very small tuning forks producing the highest audible sounds,
A set of resonators mounted together with capsules for sensitive flames, arranged for the analysis of complex sounds,
Apparatus for producing longitudinal vibrations in rods,
An electrical metronome,
Mounted tuning forks carrying small mirrors arranged to perform Lissajou's experiment, producing complex curves.

IN LIGHT:

Complete set of apparatus, made by Soleil, Paris, for the measurement of the wave length of light by various interference methods,
Sets of polarization apparatus,
Sets of lenses and spherical mirrors,
Two heliostats,
Four spectroscopes,
A polarizing saccharimeter,
Three projecting lanterns for gas or electric light, and 3,000 slides,
Set of large Nicol's prisms mounted,
Large compound prism to form widely dispersed spectrum,
Two Rowland gratings, 14,000 lines to the inch,
Set of photographs of solar spectrum by Rowland,
Several cameras with lenses and attachments,
A well equipped dark-room for photographic work,
Photometric room and equipment.

IN HEAT:

Melloni's apparatus for measuring radiation, absorption and reflection of heat, complete with a set of prepared substances,
Standard thermometers,
Air thermometers,
Steam engine indicator,
Calorimeters,
Apparatus for determing the coefficient of linear expansion, using the optical lever method.

IN ELECTRICITY AND MAGNETISM:

An absolute electrometer,
Holtz machine and apparatus for illustrating static phenomena,
Four induction coils,
Six bridges of different types,
Historical set of motors showing evolution of the modern machine from the early forms of the reciprocating type,
Ten galvanometers of various types,

Ammeters and voltmeters,
One 2,000 lb. electro magnet,
Standard resistance coils,
Several sets of storage cells,
Complete X-ray outfit,
Sets of apparatus for wireless telegraphy.

In addition to the electrical apparatus in the Department of Physics, the equipment for practical work in Electrical Engineering consists of engines, dynamos, instruments, etc., of commercial size, as follows:

A three phase A. C. induction motor, arranged to operate on single phase circuits, with a condenser compensator,
A high frequency 1000 V., 33 K. W., composite wound, Wood alternator of the latest type, with excitater and a full set of switchboard instruments,
Several transformers of different capacity,
A high tension transformer for testing insolation,
An Edison bipolar 15 K. W. 125 V., generator,
A Thompson-Houston arc light machine with regulator and fifteen lamps,
A Wood arc machine, capacity 25 lights,
An Edison bipolar 3 K. W. 125 V., dynamo, with special winding,
A Van Depoele compouud wound dynamo,
A special A. C. and D. C. 5 H. P. dynamo or rotary converter,
A series wound dynamo with wrought iron field,
A number of small motors,
A forty horse power high speed automatic engine,
A power or foot lathe with wood turning tools, drills and hand tools for metals,
D'Arsonval and common galvanometers,
Ballistic galvanometer, standard condenser, etc., for capacity work,
Resistance boxes, standard megohms, etc.,
High resistance Thompson galvanometer,
Standard cells,
Voltameter arranged for the comparison of incandescent lamps,
A plug switchboard controlling all circuits,
A calibrating lamp rack,
A small engine belted to shafting to drive a plating dynamo and a buffer for cleaning and polishing work to be plated; solution, tank, etc.,—in all, a complete outfit for electrotype work,
A hot wire ammeter,
Twelve ammeters and voltmeters, mostly of the Weston type for direct current measurements,
A set of wood working tools,

A set of inclined coil alternating current portable instruments; voltmeter, ammeter and wattmeter,

A set of tools for metal working,

Telegraphing relays, sounders, switchboards, etc.,

Telephone apparatus, including subscribers sets of various modern types, a fifty drop manual switchboard complete and a lot of separate drops, jacks, switches, lightning arresters, etc.,

Automatic telephone switchboard containing first and second selector and connector switches, interrupter heat coils, etc., and three subscribers sets. With this apparatus all the operations involved in the operation of a 10000 system may be performed.

A complete central energy switchboad, several lines and subscribers sets and a selective signaling four party line outfit,

A collection of historical sets, including Reis' transmitter and receiver,

Standard portable bridge,

Common portable bridge,

Testing battery,

Kohlrausch bridge for measuring battery resistance, etc.,

A lot of arc lamps, series and constant potential, open and enclosed arcs of various types,

A dynomometer type wattmeter,

Recording wattmeters of various types,

A collection of motor starting rheostats,

A set of parts of incandescent lamps showing the various stages in their manufacture,

A large collection of porcelain insulators, etc., used in electrical work, including a lot of insulators for high tension transmission lines,

A lot of armature core disks, transformer core stampings, formed coils, brush holders, pole pieces, samples of insulation, commutator segments, etc., used in dynamos of good design, donated by leading manufacturers of electrical mrchinery,

A case of marked samples of wire insulators, lamps, and other construction materials,

Library of practical technical books of reference and files of leading periodicals and trade publications.

EQUIPMENT IN THE DEPARTMENTS OF BIOLOGY, GEOLOGY, AND MINERALOGY.

The Department of Biology, on the north side of the second floor of Science Hall, consists of three large class-rooms and laboratories properly ventilated and lighted. There are also private laboratories set apart for post-graduate students. All the class-rooms are furnished with charts and models necessary in teaching the different courses. The arrangement of widows is such that the rooms can be easily darkened so that a stereopticon and lantern slides on the subjects of Botany, Zoology, and Physiology may be used.

The laboratories are well equipped with compound and dissecting microscopes, and in each room there is a library of books pertaining to biological subjects. The botanical laboratory contains twenty-four compound microscopes and all the requisite accessories for work in Vegetable Histology and Cryptogamic Botany. The general laboratory of Microscopy, Histology and Embryology is also supplied with compound microscopes and the equipments indispensable in the courses mentioned above.

The bacteriological laboratory is completely equipped with compound microscopes, incubators, sterilizers, and all the improved apparatus employed in thorough and careful work in Bacteriology. Apart from the others is a laboratory of Photo-Micrography which contains a perfect photo-micrographic instrument with a complete set of accessory apparatus for experimentation, photographing microscopic objects, making lantern-slides, etc. A large and fully equipped dark-room adjoins this laboratory.

The south side of the second floor consists of class-rooms and laboratories for the courses in Geology and

Mineralogy. The laboratories adjoining the class-rooms are well equipped for work in blow-pipe analysis and assaying.

THE MUSEUM

connected with the departments described above, is well arranged for convenience of study. The zoological collection on the second floor at present fills sixteen large cases and represents typical forms of all the orders and genera of vertebrate and invertebrate animals. A large collection of representative vertebrate skeletons has recently been added to this part of the Museum.

The botanical collection, also on this floor, consists of two complete Herbaria, one of the United States, the other of Canada. There is also a second collection of the woods and fruits of the United States, almost complete.

The collections in Geology and Mineralogy occupy the first floor. These collections are arranged in a series of cases on each side of the building. In one series is a carefully classified collection of minerals and ores. The opposite series of cases contains a large geological collection; some of the specimens here are of the rarest fossil remains of animal and plant life.

ENGINEERING HALL.

This building is situated directly south of Science Hall, and is a large three-story brick building, well lighted and heated. The two upper floors are given up to Chemistry and Pharmacy. The general Inorganic, Organic and Elementary Chemical laboratories are on the third floor, while the second floor is mostly taken up with pharmaceutical laboratories, a well equipped drug store, a lecture room and a general stock room. Each laboratory is provided with ample hood accomodations, and each desk is furnished with water, gas, and suction.

The southern portion of the second story of this Hall is used for the

CIVIL ENGINEERING DEPARTMENT.

The equipment for this department is sufficient for all the practice and exercises in the field necessary to illustrate and teach the practical methods of engineering. The instrumental outfit consists of one surveyor's transit, two engineer's transits, with levels and vertical circles attached to telescopes, one engineer's Y-level, and a plane table with all the attachments, clinometers, chains, tapes, etc.

MECHANICAL ENGINEERING DEPARTMENT.

The wood shop, machine shop and blacksmith shop are on the first floor. The wood shop is supplied with modern work-benches fully equipped with the smaller tools necessary for carpentry, twelve lathes for turning, a jig saw, a revolving planer and a circular saw, the whole forming an adequate equipment for a thorough mastery of joinery, scroll work and pattern making.

The machine shop contains two horizontal slide valve steam engines which are used for experimental purposes. The power for operating the machine shop is derived from the electric station of the University, two ten-horse power motors being used for this purpose, from which power is transmitted to the various machines by a line of shafting running the entire length of the building. The latest improved lathes have been provided, nine in number, varying from a five inch swing in the smallest to a large engine lathe with sixteen foot bed having a capacity for work twenty-eight inches in diameter. Two drill presses, a large planer, a shaping machine and a Brown and Sharp milling machine complete the outfit, thus making the machine shop a model of its kind. The

blacksmith shop has the usual complement for teaching, forging, annealing, welding and tool making. In the foundry work the student is instructed in the proper disposition of gates and sprues, the mixing of sand, setting up and drawing simple and complicated patterns and core making. This is supplemented with lectures on the proper mixing and heating of cast iron for the various purposes for which it is used.

In addition to the facilities afforded by the shops, the engineering students have access to the steam and power plants of the University which have been recently remodeled and made to compare favorably with the best contemporary practice. The main steam plant contains two batteries of ten horizontal tubular boilers, aggregating 1200 horse power. In connection with the boilers is installed the necessary testing apparatus as follows:— a Worthington hot water meter for measuring the amount of feed water, a feed water thermometer, for getting temperature of generated steam, a throttling calorimeter for ascertaining the quality of steam and an automatic recording pressure gauge giving a continuous record of the boiler pressure. Provision is made for finding the temperature and pressure of the flue gases by means of a pyrometer and draught gauge and for obtaining samples of flue gas for analysis. These, with a Carpenter coal calorimeter for determining the heating value of the fuel, comprise a full and complete equipment for giving the student an intimate knowledge of the practical part of boiler management and testing. A Webster feed water heater and purifier, two compound duplex pumps, two vacuum pumps working on the heating system two large Worthington fire pumps 16 by 9 by 12 with a capacity of 1500 gals. per minute, with numerous separators, steam traps, automatic reducing valves, etc., complete the apparatus in the main steam plant. A McEwen high

speed automatic engine, an Armington and Simms engine of similar type and several low speed horizontal engines with planimeters, indicators, reducing wheels, slide rules and other necessary instruments, are used in studying the operation of the steam engine, distribution and economy of steam, regulation, valve setting and heat wastes.

SORIN HALL.

This building is 144 feet in length, with two wings 112 feet in depth. It has a basement and three high stories, and contains 101 private rooms for advanced students. These rooms are furnished, and students of Senior, Junior, or Sophomore standing in any of the Collegiate Courses are not required to pay rent. On the first floor there is a chapel, a law lecture room, and a law library. The building is lighted with electricity and heated with steam. In the basement are recreation rooms and bath rooms.

CORBY HALL.

Corby Hall is a second residence building. It has three stories and a basement, and it is 240 feet in width. There are 125 private rooms for students, with recreation rooms and a chapel. The building is lighted with electricity and gas and heated with steam. For room-rent and care of the room a fee is charged.

THE OBSERVATORY.

This building is located near the Engineering Hall and is designed for an equatorial telescope and for a transit or meridian circle. The equatorial telescope now in the building is intended for students of Astronomy, and is in use whenever favorable weather permits.

THE INFIRMARY.

This building, 200 feet by 45 feet in ground measurement and three stories in height, contains rooms for

the use of students during illness. The sick are nursed by Sisters of the Holy Cross, and the University physician visits them daily.

THE GYMNASIUM.

The gymnasium which was burnt down in November, 1900, was replaced by a building 230 by 200 feet in dimensions. The track-hall is now 100 by 180 feet on the ground: it is used for indoor meets, winter baseball practice, basketball and military drill. The gymnastic hall is 100 by 40 feet and is furnished with a full set of new apparatus; below that are the offices, dressing-rooms and showerbaths. Friends of the University and the alumni contributed more than $3,000 to the fund for re-building.

The Cartier Field is an enclosed field for athletic games. There is a permanent grand stand near the baseball diamond and the cinder track, and a portable stand near the football rectangle. The field contains ten acres of ground, and is a gift to the University from Mr. Warren A. Cartier, C. E., of the class of '87.

OTHER BUILDINGS.

There are numerous other large buildings connected with the University; of these the principle are: Saint Joseph's Hall, Holy Cross Hall, the Community House, the Presbytery, and Saint Edward's Hall.

DISCIPLINE.

Official bi-monthly reports of each student's class standing will be sent to parents and guardians.

The Faculty maintains that an education which gives little attention to the development of the moral part of a youth's character is pernicious, and that it is impossible to bring about this development where students are granted absolute relaxation from all Faculty government while outside the class-room. A young man must learn obedience to the law by the actual practice of obedience, not by mere appeals to honor.

Moreover, the quiet and concentration of mind that are needed for collegiate work are not obtained except where discipline exists.

Therefore the following regulations, shown to be salutary by experience, are enforced at the University:

1. No student shall leave the University grounds without permission from the President or the person delegated to represent him.

2. *Leave of absence will not be granted to students during the term time, except in cases of urgent necessity. There is no vacation at Easter.*

3. Students are required to report at the University immediately after arriving at South Bend. This rule is binding not only at the beginning of the scholastic year, but at all other times when leave of absence has been granted. Unnecessary delay in South Bend is looked upon as a serious violation of rule.

4. *Flagrant disobedience to authority, cheating in examinations, the use of intoxicating liquors, immorality, the use of profane and obscene language, and an unauthorized*

absence from the college limits are among the causes for expulsion. In case of suspension or expulsion for such offences, *no fees will be returned.*

5. No branch of study shall be taken up or discontinued without the consent of the Director of Studies.

6. Preparatory students are enrolled in Brownson, Carroll or St. Edward's Hall according to age: boys seventeen years of age or older are placed in Brownson Hall; those over thirteen and under seventeen, in Carroll Hall; and those under thirteen, in St. Edward's Hall.

7. The use of tobacco is forbidden except to those students of Sorin, Corby and Brownson Halls that have received from their parents written permission to use tobacco.

8. Continued violation of regulations in Sorin or Corby Halls leads to forfeiture of rooms.

9. *Although students of all religious denominations are received, the University is nevertheless a strictly Catholic institution, and all students are required to attend divine service in the College Church at stated times.*

10. The use of intoxicating liquors is strictly prohibited.

11. Undue attention to athletics at the expense of study will not be permitted, but students are expected to take part in outdoor sports and other games.

12. A limited number of athletic contests is permitted with college organizations from without.

13. All athletic associations of the students is strictly forbidden to countenance anything that savors of professionalism.

14. All athletics will be governed by a Faculty Board of Control which will be guided in its rulings by the regulations adopted by the Conference Colleges. The President of the University and members of the Faculty will compose this Board, and reserve the right of a final

decision on all questions concerning athletics. The Faculty Board will determine the amateur standing of the members of the athletic teams and apportion the finances. By this means indiscreet and unconsidered action of students will be checked.

LECTURES AND CONCERTS.

Each winter, eminent men are invited to lecture before the students. Among those who have addressed the University in the past few years may be noted four Apostolic Delegates: Cardinals Satolli and Martinelli, and Monsignors Falconio and Agius; Archbishops Ireland, Riordan, Keane, Glennon and Christie, and Bishops Spalding, Alerding, McQuaid, O'Gorman and Shanley. There were also such noted European churchmen as the Abbé Felix Klein and the foremost of living English historians, Dom Gasquet, besides men of letters like Marion Crawford, Maurice Francis Egan, Henry Van Dyke, Seumas MacManus, William Butler Yeats, James Jeffrey Roche, Hamilton Wright Mabie and Henry James, and such men of affairs as Senator Taft, ex-Senator Hill, Senator Beveridge, Secretary of Navy Charles Jerome Bonaparte, William P. Breen and Bourke Cockran. Concerts are given frequently by organizations from without.

EXPENSES.

Matriculation Fee (payable on first entrance) ..... $ 10.00

BOARD, TUITION, (Latin, Greek and Modern Languages included) Lodging, Washing, and Mending of Linens, per Session of nearly Ten Months 400.00

PAYABLE IN ADVANCE, as follows:

On Entrance in September:

Matriculation Fee (payable first year only) ..... $ 10.00
First Payment on Board and Tuition 250.00
Deposit on Book and Stationery Account 10.00
Special Lecture and Concert Course 3.00

Also, in this First Payment must be included any extra Expense the student may wish to incur, such as charges for Private Room, Special Courses (listed below), and Spending Money.

On January 15:

Balance on Board and Tuition $150.00
and any extra expenses the student may have incurred.

No rebate will be allowed for time absent at the opening of the Sessions, September and January. The charge of $400.00 covers the tuition fee, which is fixed at $100.00 per Scholastic Year. The latter sum is accepted as an entirety for tuition during the Scholastic Year, and will not be refunded in whole or in part if the student be dismissed for wilful infraction of the fundamental rules and regulations herein stated and hereby brought to his notice; and so likewise in the event of his leaving and absenting himself from the University at any time or for any cause without proper permission. However, an exception is made if it seems to be expedient for him to go to his home because of severe or protracted illness. *Degrees will not be conferred on any student whose accouut with the University has not been settled.*

SPECIAL EXPENSES—PAYABLE IN ADVANCE:

For whole Session of nearly Ten Months.

PRIVATE ROOMS—

Sorin Hall: Seniors, Juniors and Sophomores, Free;
Freshmen $50.00
Corby Hall 80.00

While the students, as a rule, are advised to confine themselves to the regular studies of the course they have entered, any of the following may be taken at the rate mentioned per Scholastic Year. The charges will be *pro rata* for any portion of the year.

Instrumental Music—Lessons on Piano and use of Instrument	$60.00	Use of each Instrument	$ 5.00
Use of Piano for Advanced Students	30.00	Vocal Culture	40.00
Telegraphy	25.00	Elocution — Special Course	10.00
Typewriting—Full Course (20 Lessons)	5.00	Use of Library	5.00
Phonography	25.00	"Scholastic"—College Paper	1.50
Practical Mechanics	30.00	Artistic Drawing	25.00
Lessons on Violin, Guitar, Flute, Cornet, Clarinet or Mandolin	30 00	Applied Electricity	40.00
		Special Lecture and Concert Course	3.00
		Gymnastics—Full Course (20 Lessons)	5.00

Laboratory Fees Listed under Regular Courses.

GRADUATION FEE.

For all Courses leading to a Degree, $10.00; Commercial Course, $5.00.

REMARKS.

The Entrance Fees, cost of Books, Music and Laboratory Fees, etc., are required with first payment.

Remittance should be made by draft, post office money order or express, payable to the order of the President.

Checks on local banks are not desirable, and exchange will be charged in all cases.

Term bills and other accounts are subject to sight draft if not paid within ten days after they have been rendered.

Sorin, Corby, Brownson and Carroll Halls are closed during the months of July and August. Students wishing to spend their Summer Vacation under the care of the College Authorities can be accomodated at San José Park, Lawton, Michigan.

In consequence of benefactions lately received by the University, a limited number of students aspiring to the ecclesiastical state can be received at special rates. Fuller information can be obtained by addressing the President.

COLLEGE OF ARCHITECTURE.

Architecture is, fundamentally, a fine art; but it is a fine art that may be expressed on so large a scale that a deep and comprehensive knowledge of engineering science is necessary to make its expression stable.

The Master-Architect is the heaven-gifted man who, having conceived his projects in ultimate beauty of form, color, texture, and ornament, can build them structurally and economically perfect. It is seldom that any mind combines all of these attributes. It is more seldom that to-day's practice requires them in any one man. To-day, one man "designs"; another "frames."

It is the recognition of these two almost independent phases of Architecture that has caused the University of Notre Dame to detach the Course in Architecture from the School of Engineering and to create the new College of Architecture.

The Faculty of the College now offer three undergraduate courses and two graduate courses to men able to furnish the entrance requirements. The *Beaux-Arts* Course requires four years for completion and is offered to students wishing to specialize in design. The degree of Bachelor of Arts in Architecture is given at completion. The Engineering Course is of the same length and is offered to men wishing to specialize in construction. The degree is Bachelor of Science in Architectural Engineering. Graduate years are offered in both courses, and, upon completion, Master's degrees are conferred. A Short Course covering two years is offered to students finding it impossible or inexpedient to devote

to school work the time required for completing the courses leading to degrees. Upon completion of the Short Course a Certificate of Proficiency is given.

The general scheme of the courses provides for work in the draughting-room continuously during the morning hours from 8 to 12, and for three periods of class-room work in the afternoon. In the Senior Years and in the Short Course the class-room requirements are less and the time to be spent in the draughting-room correspondingly lengthened.

Students matriculating for the Short Course or either of the complete courses must be at least eighteen years of age and must have completed the work preparatory to the Courses either in the Preparatory Department of the University or in another accredited school. Or, entrance may be by examination, at the University on the first two days of the Fall Term or in Chicago at the Offices of the University on days announced in the press of that city.

Students may not matriculate with more than one condition, and any condition interfering with the routine of the courses must be worked off privately.

For students matriculating with advanced standing there must be a corresponding increase in the age limit.

Students taking the work of either of the graduate years must have received their Bachelor degree in Architecture (or in Architectural Engineering) from Notre Dame or another School of Architecture of equal standing. The University will confer the Master's degree on her own graduate students not in residence at the end of one year if that time is spent in an *atelier* of the first order or in travel abroad following an approved programme of study and investigation; or at the end of not less than two years if that time is spent in practice and the University's requirements are complied with.

EQUIPMENT.

The Equipment of the College of Architecture, from a small beginning, is rapidly becoming more and more complete. There are a number of signed drawings—some from the *Ecole de Beaux-Arts;* others from architects of national reputation; photographs, engravings, plaster models, reference books and manufacturers' calalogues and samples. The collection, however, needs to be increased faster than the resources of the University will permit. Philanthropic friends of Notre Dame can not give money, or its eqivalent, for a better purpose. The Endowment of a Travelling Fellowship, preferably for the study of European Ecclesiastical Architecture, will be a benefaction of the utmost practical value. One thousand dollars will provide for one man for one year.

EXPENSES.

In addition to the regular fees for matriculation, tuition, and board and lodging (if in residence), etc., as given in the General Bulletin, students in the Courses in Architecture are required to pay the scheduled laboratory fees as follows:

Chemistry.....$10.00

ENTRANCE REQUIREMENTS.

Candidates for the Freshman Year in either complete course or for the First Year of the Short Course must be prepared to pass an examination in the branches named below, unless they have done their preparatory work at Notre Dame or at an accredited High School.

English—Part of the examination time is given for answering questions upon books required to be read in the preparatory course in English (See pages 61 and 62); the remainder for writing an essay.

ALGEBRA — Fundamental operations, simple equations, involution and evolution, radicals, radical equations and quadratic equations, including everything up to logarithms, as given in Wentworth's "College Algebra," or an equivalent in the larger treatises by other authors.

GEOMETRY — Plane and Solid, including the solution of simple original problems and numerical examples, as given in the works of Wentworth, Chauvenet, Newcomb, or an equivalent in treatises by other authors.

TRIGONOMETRY — Plane and Spherical.

HISTORY — A general knowledge of the outlines of Greek and Roman History and of Mediaeval and Modern History, as set out in the text used in the high schools and academies of the country.

GEOGRAPHY — Physical, as much as is contained in the ordinary text-books.

PHYSIOLOGY — Martin's "Human Body," or an equivalent.

BOTANY — Elementary.

ZOOLOGY — Elementary.

CHEMISTRY — Elements of inorganic chemistry, as given in high schools of good standing.

PHYSICS — Elementary. The preparation on this subject should include a course of lectures illustrated by experiments, and recitations from a text-book similar to Carhart and Chute's or Gage's Laboratory work is recommended, but is not required.

ASTRONOMY — Descriptive.

CIVICS — Elementary.

GERMAN — A two years course in German is required. Ability to translate at sight easy German into English, and easy English sentences into German.

FRENCH — An equivalent course in French may be offered for the German. In this case students will be required to begin German in their Freshman Year.

DRAWING — A knowledge of the use of drawing instruments, of elementary projection drawing and freehand.

The Programme of Studies Preparatory to the Courses in Architecture is outlined and described in this Bulletin immediately following the description of the College work.

THE BEAUX-ARTS COURSE.

DEGREES: Bachelor of Arts in Architecture,
Master of Arts in Architecture.

It has been the aim of the College in offering this course to so design it that the student pursuing it will have upon completion a liberal general education, a practical working knowledge of Construction, and a systematic and thorough training in Architectural Design and Composition. It may be undertaken by students whose artistic intuition and temperament fit them especially for the aesthetic side of a noble profession.

The course is built up around the work in the draughting-room and *atelier*, where half of the student's time is spent. The work in Design, beginning in the Freshman Year with the intelligent study of the Orders and simple problems involving their combination and use, and continued in the three following years by means of minor and major problems involving the planning of all classes of buildings from the simplest to the most monumental, is supplemented and rounded out by exercises in the various methods and media of rendering and by a thorough course in freehand and modelling. All instruction in planning and composing is based on correct principles of design.

The materials and methods of all trades and professions engaged in building operations are systematically studied in the Construction classes throughout the four

years of the course. The writing of specifications for each branch of labor is studied synchronously. Practical work in the various trades is given that the student may know good work and thus be able to superintend construction intelligently. These practical lessons are supplemented by weekly inspection trips to the important building operations and industries in the neighborhood of the University.

The standard Hand-books and Mill-books are used as supplementary text-books.

Graphic methods of determining stresses in beams, girders and trusses of all forms are studied and numerous practical problems solved.

Working drawings and details of construction are made under office conditions.

Broadly speaking, it is the purpose of the College in outlining the Construction courses to equip the student to solve by *office methods* any problem he may meet in ordinary practice, it being taken for granted that graver problems requiring a deep knowledge of the higher mathematics may well be left to the Architectural Engineer.

In the last year of the course a series of lectures are given on Estimates, Contracts, Law, Business Relations, and Professional Ethics and Practice. Architects of high professional standing will give a number of the Lectures in this course.

The History of Architecture and of the allied Arts is studied in a course covering three years. The method is a combination of Lectures, Recitations and Research.

A course in Literature, Economics and Philosophy covering four years completes the curriculum.

In the Graduate Year advanced work in criticism and research is done and larger and more complicated problems are given in design.

THE ENGINEERING COURSE.

DEGREES: Bachelor of Science in Architectural Engineering, Master of Science in Architectural Engineering.

The science of Engineering has long since outgrown the practical limits of one man's abilities. To be thorough, the Engineer must specialize. One of his specializations is in Architecture. His services are needed to frame important buildings, to design their foundations and to protect adjoining property while they are in erection. The modern idea of education is to progress in a course parallel to the world's needs. The College offers the Course in Architectural Engineering because there is need of the services of the men who can complete it.

Students desiring to become Architectural Engineers should have a bent for Mathematics and for painstaking exact draughting.

The programme of studies differs from that of the *Beaux-Arts* course chiefly in that a course in pure and applied Mathematics is substituted for the course in English, Economics and Philosophy; a year in History of Construction for the one in History of Art; and in that a relatively greater amount of time, increasing each year, is spent in Construction Design.

The Graduate Year is spent entirely in the solving of problems of the first order in Architectural Engineering.

THE SHORT COURSE.

Certificate of Proficiency.

The programme of studies for the Short Course comprises most of the work of the complete courses that is essentially architectural. A glance at the Course Outline will show that there is relatively less Class-room work and correspondingly more in Design each year than in either of the complete courses.

SUMMER WORK.

Summer, or Vacation Work, consisting of sketches, projects, measured drawings or work in an Architect's office will be required of all students of Architecture.

EXPLANATION OF "HOURS".

A class hour means one hour of recitation or lecture and one (average) hour of preparation. A freehand or design hour means two actual hours in the draughting-room.

It is the intention to have the student work steadily for four hours in the draughting-room during the morning session and to attend three recitation periods during the afternoon session.

COLLEGE OF ARCHITECTURE.

BEAUX-ARTS COURSE.

(DEGREE: Bachelor of Arts in Architecture.)

FRESHMAN YEAR.

SUBJECTS FIRST TERM	Hrs. a Week	SEE FOR DESCRIPTION Page	Course	SUBJECTS SECOND TERM	Hrs. a Week	SEE FOR DESCRIPTION Page	Course
English - -	5	43	1–I.	English - -	5	43	1–I.
French* - -	5	46	4–I.	French - -	5	46	4–I.
Des. Geom. -	3	49	7–Ia.	Shades Sh'd'ws } Perspective }	3	49	7–Ib.
Construction	2	52	9–I.	Construction	2	52	9–I.
Freehand - -	2	56	12–I.	Freehand - -	2	56	12–I.
El. of Arch. -	8	58	14–I	El. of Arch. -	8	58	14–I.

SOPHOMORE YEAR.

English - -	5	43	1–II.	English - -	5	43	1–II.
French - -	3	46	4–II.	French - -	3	46	4–II.
Construction	2	52	9–II.	Construction	2	52	9–II.
El'm't'y Mech.	3	50	7–VII.	El'm't'y Mech.	3	50	7–VII.
Hist. of Arch.	2	55	11–I.	Hist. of Arch.	2	55	11–II.
Freehand -	2	56	12–II.	Freehand } Modelling }	2	56	12–II.
Pen-and-Ink	1	57	13	Water Color	1	57	13
Design - -	7	58	14–II.	Design - -	7	58	14–II.

JUNIOR YEAR.

Economics -	4	43	2–Ia.	Graph. Statics	5	51	7–XI.
Adv. Cons. -	4	52	9–III.	Adv. Cons. -	4	52	9–III.
Sanitation -	3	53	9–V.	Heat. & Vent.	2	53	9–VI.
Hist. of Arch.	2	55	11–III.	Hist. Orn'm't.	2	55	11–IV.
Theory Design	1	59	14–V	Theory Design	1	59	14–V.
Freehand -	2	56	12–III.	Freehand } Modelling }	2	56	12–III.
Design - -	8	58	14–III.	Design -	8	58	14–III.

SENIOR YEAR.

Ethics - - -	5	44	3–III.	Sociology- -	5	45	3–IV.
Electricity -	2	54	9–VII.	Business R'l't'n } Profess'l Ethics }	2	54	10
History of Art	2	55	11–V.	History of Art	2	55	11–V.
Freehand - -	3	56	12–IV.	Freehand } Modelling }	3	56	12–IV.
Design - -	12	58	14–IV.	Design, Thesis	12	58	14–IV.

* If French is offered at entrance, substitute German, 5–I., II, page 47.

COLLEGE OF ARCHITECTURE.

ENGINEERING COURSE.

(DEGREE: Bachelor of Science in Architectural Engineering.)

FRESHMAN YEAR.

SUBJECTS FIRST TERM	Hrs a Week	SEE FOR DESCRIPTION Page	Course	SUBJECTS SECOND TERM	Hrs. a Week	SEE FOR DESCRIPTION Page	Course
Algebra - -	5	47	6–I.	Anal. Geom.	5	47	6–II.
French * - -	5	46	4–I.	French - -	5	46	4–I.
Des. Geom. -	3	49	7–Ia.	Shades Sh'd'ws } Perspective }	3	49	7–Ib.
Construction	2	52	9–I.	Construction	2	52	9–I.
Freehand - -	2	56	12–I.	Freehand - -	2	56	12–I.
El. of Arch. -	8	58	14–I.	El. of Arch. -	8	58	14–I.

SOPHOMORE YEAR.

Calculus - -	5	48	6–III.	Calculus - -	5	48	6–IV.
French - -	3	46	4–II.	French - -	3	46	4–II.
Construction	2	52	9–II.	Construction	2	52	9–II.
Chemistry -	3	51	8–II.	Chemistry -	3	51	8–II.
Hist. of Arch.	2	55	11–I	Hist. of Arch.	2	55	11–II.
Freehand - -	2	56	12–II.	Freehand } Modelling }	2	56	12–II.
Pen-and-Ink	1	57	13	Water Color	1	57	13
Design - -	7	58	14–II.	Design - -	7	58	14–II.

JUNIOR YEAR.

Anal. Mech. -	3	50	7-VIII.	Mech's of Mat.	3	50	7-IX.
Adv. Cons. -	4	52	9–III.	Graph. Statics	5	51	7–XI.
Sanitation -	3	53	9–V.	Adv. Cons. -	4	52	9–III.
Hist. of Arch.	2	55	11-III.	Heat. & Vent.	2	53	9–VI.
Theory Design	1	59	14–V.	Theory Design	1	59	14–V.
Freehand -	2	56	12-III.	Freehand } Modelling }	2	56	12-III.
Design - -	8	58	14-III.	Design - -	8	58	14-III.

SENIOR YEAR.

Arch. Eng'ng	5	53	9–IV.	rch. Eng'ng	5	53	9–IV.
Electricity -	2	54	9–VII.	Business R'l't'n } Profess'l Ethics }	2	54	10
History of Construction	2	55	11–VI.	Hist. of Cons.	2	55	11-VI.
Freehand - -	3	56	12-IV.	Freehand } Modelling }	3	56	12-IV.
Design - -	12	58	14-IV.	Design–Thesis	12	58	14-IV.

* If French is offered at entrance, substitute German 5–I., II., page 47.

COLLEGE OF ARCHITECTURE.

SHORT COURSE.

(Certificate of Proficiency.)

FIRST YEAR.

SUBJECTS FIRST TERM	Hrs. a Week	SEE FOR DESCRIPTION Page	Course	SUBJECTS SECOND TERM	Hrs. a Week	SEE FOR DESCRIPTION Page	Course
Descriptive Geometry -	3	49	7-Ia.	Shades and Shadows, Perspective	3	49	7-Ib.
Construction	4	52	9-I,II.	Construction	4	52	9-I,II.
History of Architecture	2	55	II-I	History of Architecture	2	55	II-II.
Freehand -	4	56	12-I.	Freehand, Modelling	4	56	12-II.
Elements of Architecture	12	58	14-I.	El. of Arch., Design	12	58	14-I,II.

SECOND YEAR.

Advanced Construction	4	52	9-III.	Adv. Cons. -	4	52	9-III.
Sanitation -	3	53	9-V.	Heating and Ventilation	2	53	9-VI.
Electricity -	2	54	9-VII.	Graph. Statics	5	51	7-XI.
History of Architecture	2	55	II-III.	Business Relations	2	54	10
Theory of Design - -	1	59	14-V.	Professional Ethics			
Freehand -	4	56	12-III.	Theory of Design - -	1	59	14-V.
Pen-and-Ink	1	57	13	Freehand	2	56	12-IV.
Design - - -	8	58	14-II., III.	Modelling			
				Water Color	1	57	13
				Design - -	8	58	14-III.

1.—COURSES IN ENGLISH.

I.

(*a*) PROSE FORMS. Special treatment of Exposition and Argumentation. Genung's "Working Principles of Rhetoric," Part II., and Heydrick's "How to Study Literature."

[Three hours a week for one term.]

(*b*) LITERATURE. Higginson and Boynton's.

[Three hours a week for one term.]

(*c*) LYRIC POETRY.

[One hour a week for two terms.]

II.

(*a*) PROSE FORMS. Special study of the Novel and the Short Story.

[Three hours a week for one term.]

(*b*) LITERATURE. The Development of English Literature.

[Three hours a week for one term.]

(*c*) THE SONNET.

[One hour a week for two terms.]

2.—COURSES IN POLITICAL SCIENCE.

ECONOMICS.

I.

(*a*) THE ELEMENTS OF ECONOMICS, VIZ.:—Land, Human Exertions and Capital; Value, Money and Credit; Rent, Interest, Profit and Wages; and Population and Consumption. The text-book used is Walker's "Manual of Political Economy."

[Four hours a week for five months.]

3.—COURSES IN PHILOSOPHY.

III.

PRINCIPLES OF ETHICS.—(*Q. 1*) Man's last end and Happiness; the Purpose of Man in this life. (*Q. 2.*) Human Acts; Responsibility; Merit; Obstacles to Human Acts. (*Q. 3.*) Origin of Morality; Hedonism; Altruism; Sympathy; Essential Differences between Good and Evil; the Constituents of Morality; the Eternal Law. (*Q. 4.*) The Natural Moral Law; its Existence and Characters; Evolution. (*Q. 5.*) The Positive Law. (*Q. 6.*) On Conscience; Good Faith; Doubtful Conscience and Reflex Principles. (*Q. 7.*) Passions in Practical Life; their Classification; their Imputability. (*Q. 8.*) The Moral Virtues; Stoicism; Epicureanism; Christianity.

(*a*) INDIVIDUAL DUTIES—Notions of Right and Duty. (*Q. 1.*) The Duty of Man to God; Necessity of External and Public Worship; Obligation of Prayer; the fact of Sacrifice. (*Q. 2.*) The Duty of Man to Himself; Culture of the Intelligence, the Will, the Imagination, the Memory; Care of the body; Suicide essentially Unlawful. (*Q. 3.*) The Duty of Man to his Fellowmen; on Truthfulness and Lying, Homicide and Self-Defence; on Duelling; on Private Ownership, Socialism, Communism, Single Tax; on the Right to Honor and Reputation; on Contracts and Usury.

(*b*) SOCIAL DUTIES—(*Q. 1.*) The Domestic Society and Marriage; Monogamy; Polygamy and Divorce; Relations between Parents and Children. (*Q. 2.*) Education; the Part of the Parents, the Church and the State. (*Q. 3.*) On Slavery in Ancient and Modern

Times; Duties of Masters and Servants. (*Q. 4.*) On Capital and Labor.

[Five hours a week for one term.]

IV.

(*a*) MORAL SOCIOLOGY — Necessity of a Public Society; the City. (*Q. 1.*) Origin of the Civil and Political Organization; Theories of Hobbes and J. J. Rousseau; source of authority in Human Society. (*Q. 2.*) On the Divine Right of Kings; The Absolute Sovereignty of the People; the Reasonable System. (*Q. 3.*) The different Forms of Government; the Primitive Polity; the best Form of Government; Opinions of O. A. Brownson. (*Q. 4.*) On Modern Democracy; the Position of the Church; the Usurpation and Transfer of the Supreme Power; on the Government de Facto. (*Q. 5.*) On Despotism; is it Lawful to Resist a Tyrant? Theory of St. Thomas and Machiavelli on Government. (*Q. 6.*) The Distinction of the three Social Powers; Parliamentary and Representative Government. (*Q. 7.*) Qualities of a good Ruler; the Question of the Poor. (*Q. 8.*) Public Liberties; Freedom of the Press and of Conscience; the Right of the Sword; on War and Treaties. (*Q. 9.*) The International Law. (*Q. 10.*) Civilization. (*Q. 11.*) Church and State.

(*b*) GOVERNMENT OF THE UNITED STATES* — History of the Constitution; the Legislative Department of the U. S.; the Executive Department of the U. S.; the President and the Cabinet; the Judicial Department of the U. S.; the Supreme Court; the Rights of the States

* This course is sketched according to the principles laid down in "The American Republic," by O. A. Brownson, and "The American Commonwealth," by Mr. Bryce.

and the United States; Jury, Suffrage and Elections; Ballot Systems; Parties and Party Machinery; Patriotism and Religion.

4.—COURSES IN FRENCH.

I.

This Course consists in reading, writing short sentences, explaining the parts of speech, especially the regular conjugations as well as the more usual irregular verbs, then translating two at least of the following works: "French by Reading" (Houghton), "La Tache du Petit Pierre" (Mairet), "Un cas de Conscience" (Gervais), "La Main malheureuce" (Guerber), "Sans Famille" (Malot), "Reading from French History" (Super).

[Five hours a week.]

II.

The intermediate class continues and perfects all the work of Course I. Dictations and conversations are added on practical topics, and careful translation made of two or three of the following works: "Le Voyage de M. Perrichon" (Labiche), "Roman d'un Jeune Homme Pauvre" (Feuillet), "Fables choisies" (La Fontaine), "Le Médecin Malgré' Lui" (Moliere), "Le Cid" (Corneille), "Esther" (Racine), "Pages oubliées de" (Chateaubriand), "La Question d' Argent" (Dumas).

[Three hours a week.]

5.—COURSES IN GERMAN.

I.

GRAMMAR — Joynes - Meissner. Marchen and Erzahlungen, Guerber. Vol. I. and II.

THEMES — Original and imitative work.

[Five hours a week.]

II.

SPECIAL COURSE for students in the English and Scientific Courses.

GRAMMAR — Joynes - Meissner.

READINGS from scientific and literary works.

[Three hours a week.]

6.—COURSES IN PURE MATHEMATICS.

I.

ALGEBRA — This course includes a study of the binomial theorem, the theory of logarithms, choice, chance, variables and limits, series, determinants. Then follows a thorough study of the general properties and solution of equations, embracing the subjects of derivatives, transformation, detached coefficients, surd and imaginary roots, incommensurable roots, limits of roots, biquadratic equations, Des Cartes' and Cardan's rules; Sturm's theorem; Horner's method; roots of complex number and trignometric solution of cubic equations.

[Five hours a week for one term.]

II.

ANALYTIC GEOMETRY — This course includes a study of the point and right line; conic sections, their equations

and properties; discussion of the general equation of the second degree containing two variables; higher plane curves, equations of the third degree; different systems of coordinates; transformation of coordinates; spirals; an elementary course in geometry of three dimensions, embracing the point, straight line, plane, and surfaces of revolution; transformation of coordinates; quadric surfaces and supplementary propositions.

[Five hours a week for one term.]

III.

Calculus, Differential. — This course as also Course IV., is designed to meet the requirements of Engineering students. It includes a study of the methods for the differentiation of algebraic, logarithmic and exponential, trigonometric, and inverse trigonometric functions; successive differentiation and differential coefficients; treatment of implicit and compound functions; expansion of functions; indeterminate forms; partial differential coefficients of the first order and of higher orders; direction of curvature; radius of curvature; envelopes; singular points of curves, maxima and minima of functions of one independent variable, and of several independent variables; tracing curves, differentials of arcs, plane areas, surfaces and volumes of revolution.

[Five hours a week for one term.]

IV.

Calculus, Integral. — Integration of elementary forms and of rational fractions; integration by rationalization and by parts; successive integration; multiple integrals; definite integrals, limits of integration; double integration applied to plane areas; rectification of plane curves; quadratures of plane areas and surfaces of revolution; surface and volume of any solid; intrinsic equa-

tion of a curve. This course is supplemented by numerous exercises and examples.

[Five hours a week for one term.]

7.—COURSES IN APPLIED MATHEMATICS.

I.

(*a*) DESCRIPTIVE GEOMETRY — In this course are considered problems on the point, right line, and plane; single curved, and warped surfaces; problems relating to tangent planes to single curved, double curved, and warped surfaces; intersection of surfaces by planes; tangencies, development of surfaces. Numerous practical problems and exercises requiring the application of the principles of Descriptive Geometry, are added by the instructor.

[Three hours a week for one term.]

(*b*) SHADES AND SHADOWS, PERSPECTIVE — In this course the student is taught to cast conventional shades and shadows as they are used in architectural rendering, and to make perspective drawings by the most effective and rapid methods. Numerous practical problems are given in shades and shadows. For practice in perspective drawing students are required to make perspectives of all their projects and to sketch in perspective in their third and fourth years. The use of all the different *media* is required for rendering — charcoal, chalk, pencil, India ink in flat and graded washes, and water-color.

The instruction in perspective is practical rather than theoretical. All of the standard works are in the Reference Library. Students, in classes of not less than five, so electing, may study theory exhaustively.

[Three hours a week for one term.]

VII.

ELEMENTARY MECHANICS — In this course the student studies the strength of materials of construction and the principles of mechanics and their applications to structural forms. The work is more elementary than that of the course in Analytic Mechanics and requires no knowledge of Calculus.

[Three hours a week for two terms.]

VIII.

ANALYTIC MECHANICS — The aim of this course is to prepare students of Engineering for the study of the courses of Applied Mechanics. The course comprises a study of the fundamental principles of Statics, Kinematics, and Kinetics. The subjects selected are studied with the object of thoroughly preparing the engineering students to pursue the technical and practical branches of their respective courses. Some of the topics considered in this course are: work, energy, conservation of energy; power, composition and resolution of forces, centre of gravity, centre of mass, moment of inertia, acceleration, dynamics of rigid bodies, laws of friction, etc.

[Five hours a week for one term.]

IX.

MECHANICS OF MATERIALS — This course is intended to meet the requirements of Engineering students and to prepare them, by a study of the action and effect of forces on beams and structures, to design economically and intelligently the parts entering into a complete structure. The course comprises a study, according to the latest and most approved methods, of tension and its effect on materials, compression, theories of flexure and rupture from transverse stress, shearing stress, transverse strength, beams of uniform resistence,

various forms and loaded in any manner, design and strength of beams and columns, effect of long continued stresses, and repeated stresses, factor of safety and working stresses, strength of pipes and cylinders, theory and practice of riveting, torsion, transmission of power by shafts, continuous girders, equation of curves of deflection, theorem of three moments, moment at any support, the resilience of materials, apparent stresses and true stresses, etc.

[Five hours a week for one term.]

XI.

GRAPHIC STATICS.—In this course the student is taught to determine stresses by graphical methods. Centers of Gravity, Moments of Inertia, Shear and Bending Moments of Beams under all conditions of loading are determined by the application of the principles of the force and equilibrium polygons. Stresses in trusses and built up girders, in masonry arches and domed structures are determined graphically. Methods of determing appropriate sections are taught. Numerous practical problems are given.

[Five hours a week for one term.]

8.—COURSES IN CHEMISTRY.

II.

(*a*) GENERAL DESCRIPTIVE CHEMISTRY.—Recitations and experimental lectures treating of the fundamental principles of chemistry, and designed to meet the requirements of the students of the Engineering Course. Text-book, "Remsen's Briefer Course."

[Two hours a week for two terms.]

(*b*) A Laboratory Course arranged to fit the needs of Engineering students.

[One hour a week for two terms.]

9.—COURSES IN CONSTRUCTION.

I. and II.

Construction — In these courses the student obtains a thorough knowledge of the materials and methods of the Mason's, Carpenter's, Metal Worker's and Painter's trades. Each trade is considered separately, and at conclusion an exhaustive study of specification writing and methods of estimating for it is made. The University constantly furnishes employment to a large force of trained mechanics who will give personal lessons to the student in all branches of these trades. Inspection visits are made weekly, as a supplementary exercise in superintendence, to important building operations in the neighborhood. Detail drawings of constructive methods are made exactly as in an Architect's office.

In the spring terms of his last three years each student is required to stake out on the campus one of his projects and to furnish all levels required by the builder in order to acquire thoroughness in the use of the Architect's Level and Compass.

[Two hours a week for four terms.]

III.

Advanced Construction — In this course the student studies the construction and design of steel framing, fireproofing of all forms, reinforced concrete, footings and foundations.

Working drawings for one of the student's projects are

made. Especial care and accuracy are demanded in the preparation of the framing plans and details. This work is traced and blue-printed by Freshmen students.

[Four hours a week for two terms.]

IV.

Architectural Engineering — A course in which are solved graphically and analytically more complicated problems in structural design and applied mechanics, with especial study of reinforced concrete.

[Five hours a week for two terms.]

V.

Sanitation — This study is taught from text-book and embraces sanitary engineering pertaining to buildings, as follows: sewerage, water supply, lighting and ventilation, plumbing work, subsoil drainage, dry foundation walls and cellars. Also drawings of plumbing systems and fixtures.

[Two hours a week for two terms.]

VI.

Heating and Ventilation — This course is a study of the theory and practice of heating and ventilating public buildings and dwelling houses. The different systems of heating, — furnace heating, hot water, steam, etc., — are carefully examined and studied. The radiation of heat from surfaces, the different systems of piping, condition of air as to moisture, amount of air required, causes and best means adopted to secure pure air; the necessity of good ventilation and the latest approved methods for securing this all important feature are some of the topics considered in this study.

[Three hours a week for one term.]

VII.

ELECTRICITY — A course of lectures and recitations, on the general theory of electricity and magnetism and its application to practical work, as follows: Setting up and testing primary and secondary batteries, systems of call bells, electric and gas lighting appliances, fire and burglar alarms, telegraph and telephone lines, switch-boards and accessories, arc and incandescent lighting systems, etc.

[Two hours a week for one term.]

10.—COURSES IN BUSINESS RELATIONS.

This course consists of lectures in which are given descriptions of a system of book-keeping suited to the needs of an Architect's business, a system of building accounts, filing systems for catalogues and prints, a card-index system for prints and general information; of forms for Agreements with Clients, for Proposals and Acceptances, for Contracts and Bonds, and for Certificates; the laws affecting Clients, Contractors and Architects; and the rules of Professional Ethics in Private Practice, Competitions and Municipal Affairs.

[Two hours a week for one term.]

11.—COURSES IN HISTORY.

I, II. and III.

HISTORY OF ARCHITECTURE.—This course comprises a study of the early beginnings, growth and development of Architectural styles. It includes Ethnography as applied to Architectural Art; Ancient Architecture; Egyptian Architecture; Assyrian Architecture; Grecian Architecture; Etruscan; Roman and Sassanian Architecture; Christian Architecture in France, Belgium and Holland, Germany, Scandinavia, England, Spain and Portugal, and Italy; Saracenic and Ancient American Architecture; Byzantine Architecture.

[Two hours a week for three terms.]

IV.

HISTORY OF ORNAMENT.—A study of the origin and evolution of ornament and the application of same, together with exercises in motive.

[Two hours a week for one term.]

V.

HISTORY OF ALLIED ARTS.—A brief study of the field of Art with especial reference to Sculpture, Metal Working, Mural Painting, Stained Glass and Mosaic.

[Two hours a week for two terms.]

VI.

HISTORY OF CONSTRUCTION.—A critical study of the types of Construction of the ancient, mediaeval and modern builders, tracing the relation of the type to the problem and the development of the style from the type.

[Two hours a week for two terms.]

12.—COURSES IN FREEHAND AND MODELLING.

I. and II.

(*a*) Elementary Freehand — Drawing from casts of ornaments purely geometrical, such as mouldings, ovoloes, dentils, etc. Sketching from simple objects.

(*b*) Drawing from casts of ornaments of which the elements are living forms, such as ornamental leaves and flowers. Sketching from nature of leaves and flowers.

(*c*) Drawing from architectural elements, such as pedestals, bases, shafts, cornices, etc. Lectures on perspective, direction of the principal lines in relation to the horizon. Elementary notions on the five orders of architecture.

(*d*) Drawing from casts of the human figure : hands, feet, masks, etc. Architectural ornaments. Sketching from familiar objects.

[Two hours a week for four terms.]

III.

(*a*) Antique Class — Drawing from the antique of heads and busts. Still life drawing. Sketches of landscapes from nature. Selection of a subject. Composition in landscape. Applications of perspective.

(*b*) Drawing from the antique, full figure. Occasional studies of the head from the living model. Sketching from the costumed model. Still life in water colors.

[Two hours a week for two terms.]

IV.

Life Class — Drawing from life. Artistic anatomy. Anatomical studies from the collections of Science Hall.

[Three hours a week for two terms.]

MODELLING — One solid week in the spring terms of the Sophomore, Junior and Senior years is devoted to modelling in clay. The objects modelled are architectural forms, copied from the cast or made from the student's drawings of his own work, as his progress and ability may warrant.

SKETCH CLASS — One hour a week. This class is open also to the students in the Mechanical Drawing classes. The students have themselves an organization, "The Crayon Club," the object of which is to sketch college scenes and to do illustrative work: these sketches are brought into class and criticized.

All students of the Courses in Architecture are required to attend the sessions of the Sketch Class.

13.—COURSES IN RENDERING.

PEN AND INK — Rendering drawings in pen and ink from studies by noted artists in this branch of art; followed by rendering from photographs and of original drawings.

WATER COLOR — The rendering of architectural drawings, including perspectives: — casting of shadows, color treatment of buildings, and handling of foreground and background.

[One hour a week for two terms.]

While the catalogued time for the Courses in Rendering is one hour a week for two terms, for better results the work will be given in two eighteen hour periods (thirty-six actual hours) in each term.

Practice in rendering is continued throughout the entire length of the Courses.

14.—COURSES IN DESIGN.

I.

THE ELEMENTS OF ARCHITECTURE — This course is a study of the Five Orders of Architecture and is given by lectures, recitations and drawing. The study embraces a thorough analysis of each Order, in which the principal and distinguishing features of each are clearly shown and comparisons made. Also a study in detail of the forms and proportions characterizing each is made in the class room. Problems pertaining to the Orders are given in the Drawing Room, and detail drawings and colorings made.

[Eight hours a week for two terms.]

II. III. and IV.

DESIGN — The study of problems in architectural design, embodying the subjects of composition and form. This course expands from Elementary Design (second year) to Advanced Design and Thesis Work (fourth year), and includes the handling of design in monumental structures, and its application to modern buildings, such as hospitals, theatres, municipal buildings, libraries, churches, etc.

The programme for the second year requires the execution of nine minor, (one day), and nine major problems; that for the third year of nine minor and six major problems; that for the fourth year of four minor and three major problems and the thesis.

Students of the Engineering course will be given Engineering problems exclusively beginning with the second term of the third year.

[Seven, eight and twelve hours a week, respectively, for three years.]

THESIS — All of the time for design during the second term of the last year is devoted to the preparation of the graduating thesis. The subject in each case is selected by the Professor of Design or of Construction.

V.

THEORY OF DESIGN — A thorough study of the principles of planning and proportion, supplemented by study of the perfections and faults of the world's most famous buildings.

[One hour a week for two terms.]

COLLEGE OF ARCHITECTURE.

Programme of Studies Preparatory to the Course in Architecture.

FIRST YEAR.

SUBJECTS FIRST TERM	Hrs. a Week	COURSE	SUBJECTS SECOND TERM	Hrs. a Week	COURSE
English - -	5	A	English - -	5	A
Mathematics	5	A	Mathematics	5	B
History - -	3	A	History - -	3	A
Science - -	5	A	Science - -	5	C
Science - -	3	B	Science - -	3	D

SECOND YEAR.

English - -	5	B	English - -	5	B
Mathematics	5	C	Mathematics	5	D
History - -	3	B	History - -	3	B
Science - -	5	E	Science - -	5	E
Civil Gov'm't	2	A	Civil Gov'm't	2	A

THIRD YEAR.

English - -	5	C	English - -	5	C
Mathematics	5	E	Mathematics	5	F
History - -	3	C	History - -	3	C
Science - -	5	F	Science - -	5	F
German - -	5	A	German - -	5	A

FOURTH YEAR

English - -	5	D	English - -	5	D
Mathematics	5	G	Mathematics	5	H
Science - -	2	G	Science - -	2	G
German - -	3	B	German - -	3	B
Drawing - -	6	A & B	Drawing - -	6	C

French may be substituted for German in the 3d and 4th years.

DESCRIPTION OF COURSES.

COURSES IN ENGLISH.

A.

(*a*) Meiklejohn's "Art of Writing English," with daily exercises in class. Two themes a week.

(*b*) The elements of versification. Scansion, one hour a week. Weekly exercises in writing verse. Memory work.

(*c*) Required reading: Poe's "Poem's," "Evangeline," "Fioretti," "Snow-Bound," "The Vision of Sir Launfal," "Ancient Mariner," "The Sketch Book," "Robinson Crusoe," Poe's "Tales," "Treasure Island," "The Merchant of Venice," "Julius Caesar."

(Some of these works to be thoroughly studied, at the discretion of the teacher.)

[Five hours a week for one year.]

B.

(*a*) Hill's "Principles of Rhetoric," Part I., with daily exercises in class. Two themes a week.

(*b*) The simpler verse-forms. Weekly exercises. Memory work.

(*c*) Required reading: "The Lady of the Lake," "Silas Marner," "The Princess," "The Flight of the Tartar Tribes," "The Courtship of Miles Standish," "Ivanhoe," "As You Like It," "Macbeth."

(Some of these works to be thoroughly studied, at the discretion of the teacher.)

[Five hours a week for one year.]

C.

(*a*) Hill's "Principles of Rhetoric," Part II., with daily exercises in class. Fortnightly theme.

(*b*) Verse-forms continued. Weekly exercises. Memory work.

(*c*) Required reading: "The Golden Treasury of English Lyrics," Milton's "Minor Poems," Macaulay's "Essay on Milton," "Sir Roger de Coverley," Macaulay's "Essay on Addison," Burke's "Speech on the Conciliation of America," Webster's "Bunker Hill Oration," Lincoln's "Gettysburg Oration," "A Midsummer Night's Dream," "King Lear."

(Some of these works to be thoroughly studied, at the discretion of the teacher.)

[Five hours a week for one year.]

D.

(*a*) Genung's "The Working Principles of Rhetoric," Part I., with daily exercises in class. Monthly essay.

(*b*) Verse-forms concluded. Weekly exercises. Memory work.

(*c*) Required reading: Selections from "Paradise Lost," Cary's "Dante" and Pope's "Homer," "The Idylls of the King," "The Dream of Gerontius," Aubrey de Vere's "Poems," "The Tempest," "Hamlet," Gates' "Selections from Newman," "The House of the Seven Gables."

(Some of these works to be thoroughly studied, at the discretion of the teacher.)

[Four hours a week for one year.]

COURSES IN MATHEMATICS.

A.

ALGEBRA — This course for beginners in Algebra includes a study of the primary fundamental principles necessary to the courses which follow. The subjects dwelt upon in particular are Factoring, Highest Common Factor and Least Common Multiple, which are afterward applied in their relation to Fractions and the reduction of Complex Fractions. In as far as possible, concrete examples of their applications to kindred scientific subjects are supplied by the teacher.

[Five hours a week for one term.]

B.

ALGEBRA — In this course the study of Equations is begun and continued through equations of the first degree. Fractional Equations, Systems of Simultaneous Equations, Involution, Evolution, Radicals and Exponents complete the course which is supplemented wherever possible with problems of practical application.

[Five hours a week for one term.]

C.

ALGEBRA — This course begins with Quadratic Equations, Pure and Affected, followed by Systems of Simultaneous Quadratic Equations and those forms of Radical Equations of Higher Degree which may be solved by quadratic methods. Ratio and Proportion, Indeterminate Equations, Surds, Imaginaries, Inequalities, the Progressions and the Binomial Theorem finish the work in this course. As in the preceding courses, special stress is placed upon the application of the theory to such examples as will show its application to elementary scientific subjects.

[Five hours a week for one term.]

D.

GEOMETRY — This subject is completed as far as the end of Plane Geometry and includes a study of the theorems with proofs of exercises and original propositions. The habit of independent thinking is cultivated to some extent by the solution of special problems of concrete nature intended to exhibit the relation of the processes studied to practical examples.

[Five hours a week for one term.]

E.

GEOMETRY — The study of Solid Geometry is taken up in this term, the course being an extension of that of the preceding term. Planes, Solid Angles, Polyhedrons, the Cylinder, Cone and Sphere are all studied in detail and the solution of original exercises and propositions of application is made a feature of the course.

[Five hours a week for one term.]

F.

ALGEBRA AND GEOMETRY — This course which continues through one scholastic year is designed especially for those students who wish to take up the study of Engineering. As this necessitates a thorough ground work in mathematics, the first half of the year is given to a review of Algebra and Geometry, three hours and two hours per week respectively. The most important theorems and subjects are again studied and a more comprehensive view of the subject is attained in the generalizing of many theorems and extending the range of others.

[Five hours a week for one term.]

G.

ALGEBRA AND GEOMETRY — The work of this term is entirely given up to an elementary exposition of the

application of mathematics to scientific problems and to analysis. In lectures and class work actual problems representing existing and practical conditions will be taken up, and the derivation of approximate formulæ and an elementary study of curves derived from experiment are included.

[Five hours a week for one term.]

H.

TRIGONOMETRY — A half year is given to this subject which includes both Plane and Spherical Trigonometry. The work done is the equivalent of that in most of the elementary text-books. Special attention is given to Goniometry on account of its application to Calculus, and examples of a concrete nature are abundantly supplied.

[Five hours a week for one term.]

COURSES IN HISTORY.

A.

ANCIENT HISTORY — Fisher's "Outlines of Universal History." The Oriental Nations. The History of Greece and of the Empire of Alexander. The Story of Rome. The Establishment of the Empire, and the rise of Christianity.

[Three hours a week for one year.]

B.

MEDIAEVAL HISTORY — Fisher's "Outlines." The Barbarians and their Kingdoms. Mahommedanism and the Saracen Caliphs. The Holy Roman Empire. The Invasion of the Northmen and the Magyars. The Em-

pire and the Papacy. The Great Schism and the rise of the nations of Modern Europe.

[Three hours a week for one year.]

C.

MODERN HISTORY — Fisher's "Outlines." The Renaissance. The Age of Discovery. The Protestant Reformation. The Power of Spain. The Strifes of France with Spain and Germany. The age of Louis XVI., and the rise of Russia. The Spanish and Austrian Successions. The Empire of England. The American Revolution. The French Revolution and the Wars of Napoleon. The Revolutions and the Spirit of Nationality. The Formation of Germany and Italy.

[Three hours a week for one year.]

COURSES IN SCIENCE.

A.

PHYSICAL GEOGRAPHY — An introductory and elementary study of the earth and its environments. The student will be led into a closer sympathy with the world about him. The various types of plant and animal life together with topographical and climatic conditions will be considered.

[Five hours a week for one term.]

B.

PHYSIOLOGY — Lectures, recitations and demonstrations with the stereopticon. The study of the human skeleton including the physiology and hygience of the bones. The action, relation, structure and hygiene of

muscles. The digestive, circulatory and excretory systems demonstrated by models and charts. The anatomy and structure of the nervous system and simple experiements on the same. Text-book, Martin.

[Five hours a week for one term.]

C.

ELEMENTARY BOTANY — A course for beginners in this subject; it includes a study of the higher plants with reference to structure of root, stem, leaf, flower and seed. An introduction to the lower forms of plant life and their classification is also given. Text-book, Bastin's "Elements of Botany."

[Three hours a week for one term.]

D.

ELEMENTARY ZOOLOGY — Includes an introduction to the subjects with studies of representative forms and their classification in the different groups of the animal kingdom. The subject is taught by recitations and laboratory work. Text-book, Chapin and Rettger.

[Three hours a week for one term.]

E.

(*a*) ELEMENTARY CHEMISTRY — An introductory Course of experimental lectures on familiar subjects such as water, the air and its constituents, common salt, etc., leading up to discussions of the more important elements and their properties, and the fundamental laws and phenomena of Chemistry. Reference-book, Remsen.

[Three hours a week for one year.]

(*b*) EXPERIMENTAL CHEMISTRY — A Laboratory Course to accompany Course (a). A series of exercises to be performed by each student, and having as their

main object the cultivation of the student's powers of observation and faculty of inductive reasoning. These exercises comprise a study of the principal metalic elements, including their preparation, properties and more familiar compounds. The directions for each experiment are made as brief as possible, the observation of facts and the drawing of correct conclusions therefrom being left, so far as the nature of the experiment will permit, to the pupil.

[Two hours (four hours of actual work) each week for one year.]

F.

Elementary Physics — Instruction in the Elementary Physics is given by lectures and recitations in which the general laws of Mechanics, Heat, Acoustics, Optics, Electricity and Magnetism are presented. The course is intended to meet the needs of those who desire a general knowlege of the subject, as well as to lay the foundations for advanced work. Particular attention is paid to the correct statement of principles so that in his advanced work the student will have nothing to unlearn or relearn.

[Three hours a week for one year.]

The Laboratory Work of this course consists of a series of experiments which verify and apply practically the fundamental principles of Physics. The student also receives instruction in the use and careful handling of apparatus, accurate observation, and correct deduction of results. Neat and concise reports of all experiments are kept by each student and form the basis for the grades in this work.

[Two hours (four hours of actual work) each week for one year.]

G.

ASTRONOMY - DESCRIPTIVE — This course is intended to give students as much knowledge of astronomical facts as can be obtained with only an elementary training in mathematics. The study consists of a description of the earth; its form, size, density and motion; a study of the moon and her motions; the sun and its relation to the earth; an account of eclipses, refraction and aberration of light. A description of the planets, their distances, dimensions and physical conditions; a study of parallax, diurnal and annual; an account of meteors and comets. A study of the stars and constellations; instruction is given to enable students to name and locate the more prominent. The subject of Cosmogony is considered briefly as well as an explanation of the different systems of Astronomy. The subject is given both by lectures and text-book.

[Two hours a week for one year.]

COURSES IN CIVIL GOVERNMENT.

A.

This is a study of the science of government in connection with American institutions, and is intended to give the student some knowledge of the general principles of government and of the American Constitution. The subject begins by defining government; then is considered the object and necessity of government; origin of civil society; the principle of suffrage; different forms of government defined and compared; theories of representation. These topics necessarily are treated briefly,

as the principal part of the course consists of a study of the Colonial governments, the Articles of Confederation and their defects, the formation of the Constitution and its adoption. Now the study comprises a critical analysis of each article and section of the American Constitution, thus enabling the student to acquire a clear conception of the division of powers of the National Government and the duties and responsibilities of each department.

[Two hours a week for one year.]

COURSES IN GERMAN.

A.

GRAMMAR — Joynes - Meissner. "Deutches Lesebuck," Bone.

THEMES — Original and imitative work.

[Five hours a week for one year.]

B.

SPECIAL COURSE for students in the English and Scientific Courses.

GRAMMAR — Joynes - Meissner.

READINGS from scientific and literary works.

[Three hours a week for one year.]

COURSES IN FRENCH.

A.

Houghton's "French by Reading." "Un Cas de Conscience." Super's "Reading from French History."

[Five hours a week for one year.]

B.

French Composition. "L'Avare," "Le Voyage de M. Perichon." "Le Roi des Montagnes."

[Three hours a week for one year.]

COURSES IN DRAWING.

A. and B.

This work is based on the rudiments of drawing and consists of the training necessary for the hand and the eye. Sketching is also done from simple objects of various forms.

Advance work in sketching from objects such as the plaster cast of flowers and suitable ornaments which afford the study of light and shade.

[Six hours a week for one term.]

C.

This work embraces the principles of projections, methods of shop-drawing, tinting, tracing, blue printing, line-shading and the preparation of working drawings of complete machines.

[Six hours a week for one term.]

NEEDS OF THE UNIVERSITY.

Visitors to Notre Dame judge from the appearance of the buildings and grounds that the University has no need of money. It is, nevertheless, absolutely without endowment, and its work is seriously hampered because it has no resources except the fees of students. There are two scholarships and the interest from these foundations is used in educating and boarding two students.

There were in 1901 1,452 Catholic students in 6 per centum of the non-Catholic colleges of America, and very many of these will lose their faith, and all will be weakened in that faith, because our people look upon collegiate institutions as the property of private corporations which are to be left to take care of themselves.

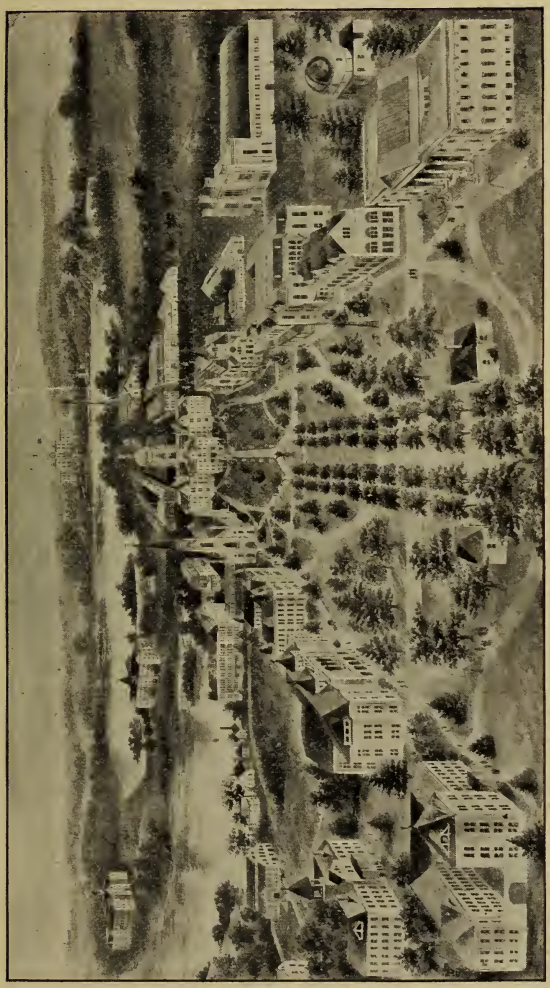
Notre Dame asks for scholarships for boys that can not pay the expense of education, and who therefore are obliged to go to non-Catholic colleges to the detriment of their faith. A foundation of $8,000 will educate and board a student as long as the University exits. As one bursar is graduated another can take his place. The founder of the scholarship, of course, always has the privilege of appointing the student.

We lack money for a library building, and for two more dwelling-halls like Sorin Hall.

Foundations for scholarships are also a pressing need.

There is no Library fund for the purchase of new books.

The names of benefactors will be given to all foundations.



THE UNIVERSITY OF NOTRE DAME — BIRD'S EYE VIEW.

BEQUESTS SHOULD BE MADE IN THIS FORM :

UNIVERSITY OF NOTRE DAME DU LAC.

I give, devise and bequeath to the UNIVERSITY OF NOTRE DAME DU LAC, an institution incorporated under the laws of the State of Indiana, and located at Notre Dame, Indiana.....

The Notre Dame Scholastic

Is a 28-page paper devoted to the interests of the students and published by them every week during term time. The journal is in the hands of a student board of editors and students do all the writing for it. Work done for *The Scholastic* is regarded as supplementary to the theoretical work of the English courses; hence the character of the articles, — essays on literary subjects, biographical sketches, short stories, exercises in verse, book-reviews, etc. As contributors are expected to prepare their own copy for the press and to do their own proof-reading, they gain no small amount of practical experience.

Although *The Scholastic* is published chiefly for the sake of the students attending the University, their parents and all former students will see things of interest in its columns. Reports of the popular lecture course and of events happening at Notre Dame and other colleges, personal notices, athlectic notes, reviews of the work done in the debating and other classes, find place in the paper and keep parents and others informed about matters that concern their children and friends.

The Scholastic will be sent to any address for $1.50 per annum.

Address all commuications to

The Notre Dame Scholastic,

Notre Dame, Indiana.

ST. MARY'S ACADEMY,

NOTRE DAME, INDIANA.

CONDUCTED BY THE SISTERS OF THE HOLY CROSS.

(One Mile West of the University of Notre Dame.)

Beautifully and healthfully located on an eminence overlooking the banks of the St. Joseph River. Enjoys a national patronage. All the branches of a thorough English, Classical, Scientific and Commercial Course with Modern Languages taught. On completion of the College Course students are entitled to the Degree A. B., Litt. B., or B. S.

THE PREPARATORY DEPARTMENT. Here pupils are trained in the regular, Special and College Preparatory Courses.

THE MINIM DEPARTMENT provides for the tender care, and special instruction of children under the age of twelve years.

THE CONSERVATORY OF MUSIC is conducted on the plan of the best Classical Conservatories.

THE ART DEPARTMENT is modeled after the leading Art Schools of Europe.

GYMNASIUM with resident director, a graduate of Dr. Sargent's Normal School of Physical Training, Cambridge, Mass. Over two hundred acres devoted to walks, and outdoor sports.

The AIM of moral, intellectual and physical training is to prepare young women for lives of usefulness. The constant growth of the Academy has necessitated the erection of additional fine buildings with latest Hygienic equipments. Moderate Cost. For Catalogue and information apply to

THE DIRECTRESS,

ST. MARY'S ACADEMY, NOTRE DAME, INDIANA.

ST. MARY'S ACADEMY—BIRD'S EYE VIEW.


CANADA
WINNIPEG
QUEBEC
MONTREAL
OTTAWA
HALIFAX
ATLANTIC OCEAN
PACIFIC OCEAN
GULF OF MEXICO
MEXICO
WASHINGTON
OLYMPIA
PORTLAND
SALEM
OREGON
IDAHO
BOISE
MONTANA
HELENA
N. DAKOTA
BISMARCK
S. DAKOTA
PIERRE
MINNESOTA
DULUTH
ST. PAUL
L. SUPERIOR
WISCONSIN
MADISON
MICH.
L. MICH.
L. HURON
LANSING
DETROIT
NOTRE DAME
L. ERIE
L. ONT.
MAINE
AUGUSTA
N. H.
CONCORD
VT.
MONTPELIER
BOSTON
MASS.
PROVIDENCE
R. I.
CONN.
HARTFORD
NEWPORT
NEW YORK
ALBANY
BUFFALO
PENNSYLVANIA
HARRISBURG
TRENTON
PHILADELPHIA
DOVER
BALTIMORE
MD.
WASHINGTON
CHARLESTON
W. VA.
VIRGINIA
RICHMOND
N. CAROLINA
RALEIGH
S. CAROLINA
COLUMBIA
CHARLESTON
GEORGIA
ATLANTA
SAVANNAH
JACKSONVILLE
FLORIDA
TALLAHASSEE
TAMPA
MIAMI
ALABAMA
MONTGOMERY
MOBILE
MISS.
JACKSON
LOUISIANA
BATON ROUGE
NEW ORLEANS
TENN.
NASHVILLE
MEMPHIS
KENTUCKY
FRANKFORT
LOUISVILLE
OHIO
TOLEDO
COLUMBUS
CINCINNATI
INDIANAPOLIS
ILLINOIS
CHICAGO
SOUTH BEND
SPRINGFIELD
CAIRO
ST. LOUIS
MISSOURI
JEFFERSON CITY
KANSAS CITY
IOWA
DES MOINES
NEBRASKA
OMAHA
LINCOLN
KANSAS
TOPEKA
OKLA.
GUTHRIE
IND. TER.
ARKANSAS
LITTLE ROCK
TEXAS
FT. WORTH
AUSTIN
SAN ANTONIO
HOUSTON
GALVESTON
CORPUS CHRISTI
EAGLE PASS
EL PASO
WYOMING
CHEYENNE
COLORADO
DENVER
UTAH
SALT LAKE CITY
NEVADA
CARSON
CALIFORNIA
SACRAMENTO
SAN FRANCISCO
LOS ANGELES
ARIZONA
PHŒNIX
NEW MEXICO
SANTA FE
LAREDO
MATAMORAS
MONTEREY
SALTILLO
TORREON
SAN LUIS POTOSI
AGUAS CALIENTES
TAMPICO
MEXICO
VERA CRUZ
PROGRESO
CAMPEACHY
BAHAMA ISLANDS
CUBA
HAVANA
CIENFUEGOS
SANTIAGO
SANTO DOMINGO
PUERTO RICO
SAN JUAN
Rand, McNally & Co., Chicago.

Series V

Number 3

BULLETIN

of the

University of Notre Dame

NOTRE DAME, INDIANA

COLLEGE OF ARCHITECTURE

PUBLISHED QUARTERLY AT NOTRE DAME

THE UNIVERSITY PRESS
JANUARY, 1910

Entered at the Postoffice, Notre Dame, Indiana, as second class matter, July 17, 1905

DIRECTORY OF THE UNIVERSITY.

The FACULTY—Address:

THE UNIVERSITY OF NOTRE DAME,

NOTRE DAME, INDIANA.

The STUDENTS—Address:

As for the Faculty, except that the name of the HALL in which the student lives should be added.

A Postoffice, a Telegraph Office, a Long Distance Telephone, and an Express Office are at the University.

The University is two miles from the city of South Bend, Indiana, and about eighty miles east of Chicago. The Lake Shore and Michigan Southern, the Grand Trunk, the Vandalia, the Indiana, Illinois & Iowa, the Chicago and Indiana Southern, and the Michigan Central railways run directly into South Bend.

BOARD OF TRUSTEES.

VERY REV. ANDREW MORRISSEY, C. S. C.,
PRESIDENT.

REV. JOHN CAVANAUGH, C. S. C.,
CHANCELLOR.

REV. DANIEL E. HUDSON, C. S. C.,

REV. WILLIAM R. CONNOR, C. S. C.,
SECRETARY.

REV. JOSEPH A. MAGUIRE, C. S. C.

BRO. ALBEUS, C. S. C.,
TREASURER.

EXECUTIVE OFFICERS OF THE UNIVERSITY

REV. JOHN CAVANAUGH, C. S. C.,
PRESIDENT.

REV. THOMAS CRUMLEY, C. S. C.,
VICE-PRESIDENT.

REV MATTHEW SCHUMACHER, C. S. C.,
DIRECTOR OF STUDIES.

REV. TIMOTHY R. MURPHY, C. S. C.,
PREFECT OF DISCIPLINE.

BRO. ALBAN, C. S. C.,
SECRETARY.

PROFESSORS AND INSTRUCTORS IN THE COLLEGE.

Rev. THOMAS A. CRUMLEY, C. S. C.,
Philosophy.

Rev. JOSEPH MAGUIRE, C. S. C.,
Chemistry and Mineralogy.

Rev. MICHAEL QUINLAN, C. S. C.,
English.

Rev. LEONARD CARRICO, C. S. C.,
English.

Rev. MATTHEW WALSH, C. S. C.,
Political Economy.

Rev. THOMAS J. IRVING, C. S. C.,
Physics.

Rev. JOSEPH P. BURKE, C. S. C.,
Sociology, History.

ROLLAND ADELSPERGER, A. B., B. S. A.,
Architecture.

JAMES F. EDWARDS, A. M., LL. B.,
Librarian.

MARTIN J. McCUE, M. S., C. E.,
Mechanics.

FRANCIS WYNNE KERVICK, B. S. in Arch.,
Architecture.

FRANCIS XAVIER ACKERMANN, M. S.,
Mechanical Drawing.

JEROME J. GREEN, M. E., E. E.,
Electrical Engineering.

WILLIAM LOGAN BENITZ, M. E., E. E.,
Mechanical Engineering.

EDWARD J. MAURUS, M. S.,
Mathematics.

GALLITZIN FARABAUGH, A. B., LL. B.,
Law.

JOHN WORDEN, B. S.,
Freehand Drawing, Modeling.

WILLIAM B. KELLEY,
Shopwork.

CHARLES PETERSEN, A. M.,
German.

DOLOR PARENT,
French.

UNIVERSITY OF NOTRE DAME.

The University of Notre Dame was founded in the year 1842, by the Very Reverend Edward Sorin, the late Superior General of the Congregation of Holy Cross. In an act approved January 15, 1844, the Legislature of Indiana gave the University power to grant degrees. The beginning of this act is:

"Be it enacted by the General Assembly of the State of Indiana, that Edward Frederick Sorin, Francis Lewis Cointet, Theophilus Jerome Marivault, Francis Gouesse and their associates and successors in office, be, and are hereby constituted and declared to be, a body corporate and politic, by the name and style of the 'University of Notre Dame du Lac,' and by that name shall have perpetual succession, with full power and authority to confer and grant, or cause to be conferred and granted such degrees and diplomas in the liberal arts and sciences, and in law and medicine, as are usually conferred and granted in other universities in the United States, provided, however, that no degree shall be conferred or diplomas granted, except to students who have acquired the same proficiency in the liberal arts and sciences, and in law and medicine, as is customary in other universities in the United States.'

COLLEGE OF ARCHITECTURE

Architecture is, fundamentally, a fine art; but it is a fine art that may be expressed on so large a scale that a deep and comprehensive knowledge of engineering science is necessary to make its expression stable.

The Master-Artist is the heaven-gifted man who, having conceived his projects in ultimate beauty of form, color, texture, and ornament, can build them structurally and economically perfect. It is seldom that any mind combines all of these attributes. It is more seldom that to-day's practice requires them in any one man. To-day, one man "designs"; another "frames."

It is the recognition of these two almost independent phases of Architecture that has caused the University of Notre Dame to detach the Program in Architecture from the College of Engineering and to create the new College of Architecture.

The Faculty of the College now offer a short course program, three undergraduate programs and two graduate programs to men able to furnish the entrance requirements.

The Short Program covering two years is designed for students finding it impossible or inexpedient to devote to school work the time required for completing the programs leading to degrees. Upon completion of the Short Program a Certificate of Proficiency is given.

The two Design Programs ordinarily require four years for completion. These programs are identical, except that one major course in one is English, with various electives in the third and fourth years, and in the other the major is Mathematics. They are offered to students wishing to

specialize in design. The degree of Bachelor of Science in Architecture is given at completion. The Engineering Program is of the same length and is offered to men wishing to specialize in construction. The degree of Bachelor of Science in Architectural Engineering is given at completion.

Graduate years are offered in both programs, and upon completion, Master's degrees are conferred.

In the fourth year and in the Short Program, the classroom requirements are less and the time to be spent in the draughting-room correspondingly lengthened.

Students matriculating for the Short Program or any of the four-year programs must be at least eighteen years of age and must have completed the studies preparatory to architecture either in the Preparatory Department of the University or in another accredited school; or, entrance may be by examination, at the University on the first two days of the fall term, or in Chicago at the offices of the University on days announced in the press of that city.

Students may not matriculate with more than one condition; and any condition interfering with the routine of the courses must be worked off privately.

For students matriculating with advanced standing there must be a corresponding increase in the age limit.

Students taking the work of either of the graduate years must have received their Bachelor degree in Architecture or in Architectural Engineering from Notre Dame or another School of Architecture of equal standing. The University will confer the Master's degree on her own graduate students not in residence at the end of one year if that time is spent in an *atelier* of the first order or in travel abroad following an approved curriculum of study and investigation; or at the end of not less than two years if that time is spent in practice and the requirements of the University are complied with.

The equipment of the College of Architecture, from a small beginning, is rapidly becoming more and more complete. There are a number of signed drawings—some from the *Ecole de Beaux-Arts,* others from architects of national reputation; a large elaborate model of the Cook County Court House, Chicago; photographs, engravings, plaster models, reference books and manufacturers' catalogues and samples. The collection, however, needs to be increased faster than the resources of the University will permit. Philanthropic friends of Notre Dame can not give money, or its equivalent, for a better purpose. The endowment of a Traveling Fellowship, preferably for the study of European Ecclesiastical Architecture, will be a benefaction of the utmost value. One thousand dollars will provide for one man for one year.

ENTRANCE REQUIREMENTS.

Candidates for the First Year in any four-year program, or for the First Year of the Short Program* must be prepared to pass an examination in the branches named below, unless they have done their preparatory work at Notre Dame or in an accredited High School or Preparatory School of equal rank.

ENGLISH. Part of the examination is given for answering questions upon the text-books and readings required in the preparatory courses in English; the remainder for writing an essay.

---

* Draftsmen, of twenty-two years of age or older, of not less than two years' experience, and others as well qualified, may take up the work of the Short Program without examination.

ALGEBRA. Fundamental operations, simple equations, involution and evolution, radicals, radical equations and quadratic equations, including everything up to logarithms, as given in *Wentworth's College Algebra,* or of an equivalent in the larger treatises by other authors.

GEOMETRY. Plane and Solid.

TRIGONOMETRY. Plane and Spherical.

HISTORY. A general knowledge of the outlines of Greek and Roman History and of Medieval and Modern history, as set forth in the texts used in the high schools and academies of the country.

CHEMISTRY. Elements of inorganic chemistry, as given in high schools of good standing. Laboratory work is also required.

PHYSICS. Elementary. The preparation on this subject should include a course of lectures illustrated by experiments, and recitations from a text book similar to *Carhart and Chute's* or *Gage's.* Laboratory work is also required.

CIVICS. Elementary.

FRENCH. A three years' course in French is required. Ability to translate at sight French into English, and easy English sentences into French.

GERMAN. An equivalent course in German or any other language may be offered for French.

DRAWING. A knowledge of the use of drawing instruments, of projection drawing and elementary freehand.

THE DESIGN PROGRAMS.

DEGREE: Bachelor of Science in Architecture
Master of Science in Architecture

It has been the aim of the College in offering the first design program to so plan it that the student will have upon completion a general liberal education, a practical working knowledge of Construction, and a systematic and thorough training in Architectural Design and Composition. It may be undertaken by students whose artistic intuition and temperament fit them especially for the aesthetic side of a noble profession.

It follows essentially the course of study planned by the American Institute of Architects, as outlined in the yearly reports of its Committee on Education.

The second program is offered for the convenience of students who desire to specialize in Mathematics rather than in English, or who have advanced standing for work done at other schools and who wish to complete the work leading to a degree at Notre Dame.

The programs are built up around the work in the draughting-room and *atelier,* where half of the student's time is spent. The work in Design, beginning in the first year with the intelligent study of the Orders and simple problems involving their combination and use, and continued in the three following years by means of minor and major problems involving the planning of all classes of buildings from the simplest to the most monumental, is supplemented and rounded out by exercises in the various methods and media of rendering and by a thorough course in freehand drawing and modeling. All instruction in planning and composition is based on accepted principles of design.

The materials and methods of all trades and professions engaged in building operations are systematically studied in the Construction classes throughout the four years of the program. The writing of specifications for each branch of labor is studied synchronously. Practical work in the various trades is given so that the student may know good work and thus be able to superintend construction intelligently. The practical lessons are supplemented by regular inspection trips to the important building operations and industries in the neighborhood of the University, and by an annual visit to Chicago of three or four days' duration, always made during the time of the Chicago Architectural Club's annual exhibit. Last year the classes saw the making of steel at the U. S. Steel Corporation's immense new plant, at Gary, Indiana; of cement at the Universal Portland Cement Co.'s Buffington plant; of architectural terra cotta at the Northwestern Terra Cotta Co.'s works, and of wrought iron and bronze at the Winslow Bros. Co.'s works. The Chicago trip is part of the required work.

The standard hand-books and mill-books are used as supplementary text-books.

Graphic methods of determining stresses in beams, girders and trusses of all forms are studied and numerous practical problems are solved.

Working drawings and details of construction are made under office conditions.

Broadly speaking, it is the purpose of the College in outlining the construction courses to equip the student to solve by *office methods* any problem he may meet in ordinary practice, it being taken for granted that graver problems requiring a deep knowledge of the higher mathematics may well be left to the architectural engineer.

In the last year of the program a series of lectures are given on estimates, contracts, law, business relations, and professional ethics and practice. Architects of high professional standing will give a number of the lectures in this course.

The history of architecture and of the allied arts is studied in a course covering four years. The method is a combination of lectures, recitation and research.

On the Chicago trip, a day is always spent visiting the Egyptian and Roman antiquities at the Field Museum, and the collection of paintings, sculpture and architectural casts at the Art Institute.

Courses either in mathematics or in English (with Electives as noted below) covering four years complete the curriculum.

In the Graduate Year advanced work in criticism and research is done and larger and more complicated problems are given in design.

THE ENGINEERING PROGRAM.

DEGREES: Bachelor of Science in Architectural Engineering
Master of Science in Architectural Engineering

The science of Engineering has long since outgrown the practical limit of one man's abilities. To be thorough, the Engineer must specialize. One of his specializations is in Architecture. His services are needed to frame important buildings, to design their foundations and to protect adjoining property while they are in erection. The College offers the Program in Architectural Engineering because there is need of the services of the men who can complete it.

Students desiring to become Architectural Engineers should have a bent for Mathematics and for painstaking, exact draughting.

The program of studies differs from that of the first Design Program, chiefly in the following particulars:

Courses in pure and applied Mathematics are substituted for the courses in English, Economics and Philosophy; the more important Construction courses go deeper into theory; Freehand work ends with the second year; the study of Historic Ornament and the Histories of the "allied arts" omitted; and a relatively greater amount of time, increasing each year, is spent on structural design.

The Graduate Year is spent entirely in solving problems of the first order in Architectural Engineering.

THE SHORT PROGRAM.

Certificate of Proficiency.

Many ambitious men, who wish to follow the profession of Architecture, find themselves unable to devote the time needed to obtain a degree; other men, who have worked as draftsmen in architect's offices, see the necessity of an education on broader lines. The Short Program is designed to meet the needs of these men. It covers a great deal of the purely architectural work of the four-year Programs. And while it comprises such elementary work as the Orders, Perspective, Shades and Shadows, the College Faculty will gladly substitute for that additional time in Design.

Candidates for the Certificate may, if proficient in other courses, substitute for them equivalent additional work from the four-year Programs.

SUMMER WORK.

Summer, or Vacation Work, consisting of sketches, projects, measured drawings or work in an Architect's office will be required of all students of Architecture.

EXPLANATION OF "HOURS."

A class hour means one hour of recitation or lecture and one to two hours of preparation.

A freehand or design hour means two actual hours in the drafting-room. There is a specified amount of work to accomplish for which credit points are given at completion. The drafting-room is open all day and is always occupied. It is desired to have the student work there steadily five hours a day. The average student can complete his work in that time.

PROGRAM IN DESIGN.

FIRST YEAR.

SUBJECTS First Term	Hours a Week	See for Description Page	Course	SUBJECTS Second Term	Hours a Week	See for Description Page	Course
English	3	26	I	English	3	26	I
El. of Arch.	8	22	I	El. of Arch.	8	22	I
Construction	4	19	I	Construction	4	19	I
Hist. of Arch.	2	18	I	Hist. of Arch.	2	18	I
Drawing	2	25	Ic	Drawing	2	25	Id
Des. Geom. Shades and Shadows	1	24	III	Perspective	1	24	III

SECOND YEAR.

English	3	26	II	English	3	26	II
Design	8	22	II	Design	8	22	II
Construction	3	20	II	Construction	3	20	II
Hist. of Arch.	2	18	II	Hist. of Arch.	2	18	II
Drawing	2	25	IIa	Drawing	2	25	IIa
Graphics	2	30	I	Graphics	2	30	I
The'y of Des.	1	22	VII				

THIRD YEAR.

Elective	4			Elective	4		
Design	8	22	III	Design	8	22	III
Construction	1	20	III	Construction	1	20	III
Hist. of Ornament	2	18	III	Hist. of Sculpture	2	18	IV
Drawing	2	25	IIb	Pen and Ink	1	26	VII
Heat and Ventilation	2	21	V	Water Color	1	26	V
				Sanitation	2	21	VI
Electricity	1	21	VII	Church Des.	1	23	VIII

FOURTH YEAR.

Elective	4			Elective	4		
Hist. of Painting	2	19	V	Bus. Ethics	2	27	I
Drawing	1	25	III	Modeling	2	25	IV
Drawing	1	26	VI	Design (Thesis)	10	22	IV
Design	10	22	IV				

At the beginning of the First Year the student matriculating for the Program in Design may, with the consent of the Faculty, elect a Major in Mathematics instead of the Major in English. The Mathematics courses for the four years will be as follows: Algebra, I; Analytic Geometry, II; Calculus, III, IV, V; Physics, II, III; Analytic Mechanics, VIII; Mechanics of Materials, X.

At the beginning of his Third Year, the student following the regular Program in Design may, if his proficiency in English warrants it, elect to follow during the Third and Fourth Years one of the following courses: English, Philosophy, Political Science, History, French or German. He may not, however, elect a course in the same language that he offered for credit at matriculation. If the above election is denied the student, he must continue his work in English for one or two years more as may decided by the Faculty.

PROGRAM IN ARCHITECTURAL ENGINEERING.

FIRST YEAR.

SUBJECTS First Term	Hours a Week	See for Description Page	Course	SUBJECTS Second Term	Hours a Week	See for Description Page	Course
Algebra	5	30	I	Anal. Geom.	5	31	II
Des. Geom.	3	27	I	Des. Geom.	3	27	I
Construction	4	19	I	Construction	4	19	I
Shades and Shadows	1	24	III	Perspective	1	24	III
Drawing	1	24	I	Drawing	1	24	II
Drawing	1	25	Ic	Drawing	1	25	Id
El. of Arch.	8	22	I	El. of Arch.	8	22	I

SECOND YEAR.

Calculus	5	31	III	Calculus	5	31	IV,V
Physics	5	32	II,III	Physics	5	32	II,III
Construction	4	20	II,III	Construction	4	20	II,III
Design	7	22	II	Design	2	25	II
Drawing	2	25	IIa	Drawing	7	22	IIa
Theory of Design	1	23	VII				

THIRD YEAR.

Anal. Mechan.	5	28	VIII	Anal. Mech.	2	28	VIII
Sanitary Eng.	2	29	XIII	Mechanics of Mat'ls	3	28	X
Electricity	1	21	VII	San't'ry Eng.	2	29	XIII
Heating and Ventilating	2	21	V	Surveying	3	27	II,III
Hist. of Arch	2	18	I	Hist. of Arch.	2	18	I
Struc. Design	8	23	V	Struct. Des.	8	23	V

FOURTH YEAR.

Arch. Eng.	2	20	IV	Arch. Eng.	3	20	IV
Bridges and Roofs	5	29	XIV	Graphics	5	30	XV
Stereotomy	3	24	VI	Hist of Arch.	2	18	II
Hist. of Arch.	2	18	II	Bus. Ethics	2	27	I
Struct. Design	8	23	VI	Struct. Des. (Thesis)	8	22	VI

SHORT PROGRAM.

FIRST YEAR.

SUBJECTS First Term	Hours a Week	See for Description Page	Course	SUBJECTS Second Term	Hours a Week	See for Description Page	Course
Hist. of Arch.	2	18	I	Hist. of Arch.	2	18	I
Construction	4	19	I	Construction.	4	19	I
Des. Geom.			III	Perspective	1	24	III
Shades and Shadows	1	24		Drawing	1	25	Id
				Pen and Ink	1	26	VII
Drawing	1	25	Ic	El. of Arch.	4	22	XV
El. of Arch.	12	22	I	Design	8	22	II
				Theory of Des.	1	23	VII

SECOND YEAR.

Hist. of Arch.	2	18	II	Hist. of Arch.	2	18	II
Construction	4	20	II,III	Construction.	4	20	III
Graphics	2	30	I	Graphics	2	30	I
Heat. and Ventilation	2	21	V	Sanitation	2	21	VI
Electricity	1	21	VII		1		
Water Color	1	26	V	Bus. Ethics	2	27	VI
Drawing	4	25	IIa	Drawing	4	25	IIa
Design	8	22	III	Modeling	2	25	IV
				Design	8	22	III
					1	23	VII

COURSES OF INSTRUCTION

ARCHITECTURE.

I AND II.

HISTORY OF ARCHITECTURE. This course includes a study of history, manners, customs, politics and religion as well as of the Architecture of Egypt, Assyria, Greece and Rome. It takes up the rise and development of Christianity and the Christian types—Basilican, Romanesque; Byzantine and its Mohammendan offshoots; Gothic and Renaissance in all their phases. Some attention is paid to Indian, Chinese and Japanese styles. A comprehensive review is made of American work. In seminar the course is completed by a study and discussion of the various phases of "The New Art", both abroad and in the United States.

Instruction is by text-book, lectures, readings and research.

Text-book, *Hamlin, Sturgis.*

[Two hours a week for four terms.]

III.

HISTORIC ORNAMENT. A study of the origin and evolution of all styles of ornament, and of its application to architectural forms, appurtenances and objects of art.

Instruction by text-book, lectures, readings, and drawings in various media.

In drawing fifteen plates are required.

Text-book, *Glazier.*

[Two hours a week for one term.]

IV.

HISTORY OF SCULPTURE. A brief historical review of ancient and modern sculpture.

Instruction by text-book, conference and research.

Text-book, *Marquand and Frothingham.*

[Two hours a week for one term.]

V.

HISTORY OF PAINTING. A brief historical and critical review of Painting.

Instruction by text-book, conference and research.

Text-book, *Van Dyke.*

[Two hours a week for one term.]

CONSTRUCTION.

I.

In this course the student obtains a thorough knowledge of the materials and methods of masonry, carpentry, roofing, metal-working, painting. Each trade is considered separately, and at conclusion an exhaustive study of specification writing and methods of estimating for it is made. Detail drawings of constructive methods are made exactly as in an architect's office.

In the spring terms of his last three years each student is required to stake out on the campus one of his projects and to furnish all levels required by the builder in order to acquire thoroughness in the use of the architect's level and compass.

The University constantly furnishes employment to a large force of trained mechanics who will give personal lessons to the student in all branches of these trades. Inspection visits are made regularly, as a supplementary exercise in superintendence, to important building operations in the neighborhood.

Instruction is by text-books and lectures.

Fifteen points must be made in inspections and drawings.

Text-books, *Kidder's Building Construction Vols. I, II; Kidder's Handbook.* Supplementary, *Sweet's Index.*

[Four hours a week for two terms.]

II.

A thorough study of foundation work—caissons, piles, grillage, spread and stepped footings; fire proofing of all forms; the design and construction of steel framing.

Working drawings for one of the student's projects are made. Especial care and accuracy are demanded in the preparation of the framing plans and details. This work is traced and blue-printed by First Year students.

Instruction is by text-books and lectures. Eight points must be made in inspections and drawing.

Text-books, *Kidder,* Vol. I; *Frietag;* Supplementary—*Sweet's Index, Carnegie* and *Bethlehem "Millbooks."*

[Three hours a week for two terms.]

III.

A study of Reinforced Concrete; Elevators; Power plants for buildings.

Instruction by text-book and lectures.

Five points must be made in inspections and drawings.

Text-books, *Watson;* Supplementary, *Sweet's Index,* Concrete Handbooks.

[One hour a week for two terms.]

IV.

Architectural Engineering. A course in which the student is taught to solve graphically and analytically more complicated problems in structural design and applied mechanics. Shoring, underpinning, retaining walls, jointed trusses, arches, vaults and domes are the more important topics.

Instruction is by text-book. Twelve points must be made in inspections and drawing.

Text-books, *Kidder, Vols. I, III; Wittmann.*

[Two hours a week for one term, three hours a week for one term.]

V.

HEATING AND VENTILATION. This course is a study of the theory and practice of heating and ventilating public buildings and dwelling houses. The different systems of heating,—furnace heating, hot water, steam, etc.,—are carefully examined and studied. The radiation of heat from surfaces, the different systems of piping, condition of air as to moisture, amount of air required, causes and best means adopted to secure pure air; the necessity of good ventilation and the latest approved methods for securing this are some of the topics considered in this study.

Instruction by text-book and lectures.

Text-book, *Carpenter.*

[Two hours a week for one term.]

VI.

SANITATION. The following are topics covered in this course: The carrying away of surface water and wastes from the building; pipes and fittings; one and two-pipe roughing-in systems; traps; domestic water supplies; pumping engines; heating of water for domestic purposes; plumbing fixtures.

Instruction is by text-book and lectures.

Text-book, *Cosgrove.*

[Two hours a week for one term.]

VII.

ELECTRICITY. Laboratory and lectures on the uses of electricity in buildings, systems of wiring, materials used, the underwriters' requirements, study of bells, telephones, electric lighting, photometry and illumination.

[One hour a week for two terms.]

DESIGN.

I.

ELEMENTS OF ARCHITECTURE. This is a course of drawing. Thirty-two plates of standard size (or their equivalent) will be made during the year. They will consist of measured drawings of the Roman and Greek orders, of the various details associated with them and of simple problems involving their use; of lettering; of exercises in wash and color; and of studies in shades and shadows and perspective.

Each plate will be examined by the Professor in charge, and may be marked "Pass," "Mention," or "Highest Mention," counting ½, ¾ or 1 point, respectively. All plates must be drawn and at least fifteen points registered.

Instruction is by text-book.

Text-books, *Ware, von Mauch, McGoodwin.*

[Eight hours a week for two terms.]

II, III AND IV.

These courses are the most important on the program. In the solving of the problems the student makes use of every item of information that he has acquired in all his other class-work, for the aim of the instruction in design is, primarily, practicability. The planning is straight-forward, logical and direct;—the design is powerful, simple, and expressive. The method is criticism. The means are major and minor problems of varying degrees of difficulty varying from a masonry gate-post to the most monumental projects. These problems are stated in programs that are made definite and practical and as like actual conditions as possible. A recent problem was a public bath and reading room on an irregular shaped parcel of ground in the neighboring city. The students surveyed the ground before beginning the sketches.

Second year men are required to execute eight minor and eight major problems; third year men, eight minor and six

major problems; and fourth year men, four minor and three major problems and the thesis.

These designs are criticised by the Professor in charge, or by some able architect especially invited. They may be marked "Pass," "Mention," or "Highest Mention," counting ½, ¾ or 1 point respectively for minor problems, and 2, 3 or 4 points for major problems.

Fifteen points must be registered in second year design, as many in third year design, and eight in fourth year design before thesis work is started.

[Eight, eight and ten hours a week, respectively, for three years.]

V, VI.

Structural Design. These courses have the same relative importance as the courses in design. The analogy goes further, the work is given as major and minor problems of varying degrees of difficulty and is judged and marked in the same manner. The scope of the problems will vary from the making of an ordinary footing plan to the framing of the structural steel work of a large dome.

The amount of work and the points required to be registered is the same for the same year as given under *Design II, III, IV.*

[Eight hours a week for three years.]

VII.

Theory of Design. A thorough study of the principles of planning and proportion supplemented by study of the perfection and faults of the world's most famous buildings.

Instruction by text-book and lectures.

Text-book, *Robinson.*

[One hour a week for one term.]

VIII.

Church Design. This course is conducted by means of lectures and research. It includes the arrangement of sanctuaries, sacristies and baptisteries as affected by liturgical needs. The subject of church furniture and accessories is also discussed.

[One hour a week for one term.]

DRAWING, MECHANICAL.

I.

FREEHAND. This course consists of sketching with pencil and pen from flat copies and models and freehand lettering. Later in the term the use of instruments, section-lining and lettering are taught. Text-book, *Jamison's Elements.*

[Three hours a week for one term.]

II.

PROJECTION DRAWING. The course embraces the principles of projection, methods of shop-drawing, tinting, tracing, blue-printing, line-shading and the preparation of working drawings of complete machines. This course must be preceded by Course I. Text-book, *Jamison's Manual.*

[Three hours a week for one term.]

III.

DESCRIPTIVE GEOMETRY. A series of accurate plates is made, illustrating the principles of orthographic and spherical projections, shades and shadows, perspective and isometric projections.

[One hour a week for two terms.]

VI.

STEREOTOMY. This course comprises a study of the application of the principles of Descriptive geometry to the determination of the forms and sizes of the stones used in the construction of the different classes of arches and masonry structures. This course is given by lectures in the drawing room, explaining the construction of templates, and the use of directing instrument; also explanations of methods of drawing plans, elevation and development of oblique arches, wing walls and the like. A certain number of plates and drawings is required, illustrating the methods of performing practical work.

Drawing and designing plans, elevations and sections of masonry, construction, foundations, dams, piers, abutments, culverts and arches. Text-book, *French.*

[Three hours a week for one term.]

DRAWING, FREEHAND AND MODELING.

I.

(*a*) Drawing from casts of ornaments purely geometrical, such as mouldings, ovoloes, dentils, etc. Sketching from simple objects.

(*b*) Drawing from casts of ornaments of which the elements are living forms, such as ornamental leaves and flowers.

(*c*) Drawing from architectural elements, architectural ornaments such as pedestals, bases, shafts, cornices, etc.

(*d*) Drawing from casts of the human figure; hands, feet, masks, etc. Sketching from familiar objects.

ANTIQUE CLASS.

II.

(*a*) Drawing from the antique of heads and busts. Still life drawing. Sketches of landscapes from nature. Selection of a subject. Composition in landscape.

(*b*) Drawing from the antique, full figure. Occasional studies of the head from the living model. Sketching from the costumed model. Still life in water colors.

III.

Life Class. Drawing from life. Sketching from the costumed model. Still life painting in water colors. Landscape painting.

IV.

Modeling. The objects modeled are architectural forms copied from the cast or made from the student's drawings of his own work, as his progress and ability may warrant.

[Two hours a week for one term.]

V.

WATER COLOR. Drawing in water color from still life and nature.

[One hour a week for one term.]

VI.

RENDERING IN WATER COLOR. The rendering of architectural drawings, including perspectives,—casting of shadows, color treatments of buildings and handling of foreground and background.

[One hour a week for one term.]

VII.

PEN AND INK. Rendering drawings in pen and ink from studies by noted artists in this branch of art; followed by rendering of original drawings.

[One hour a week for one term.]

ENGLISH.

I.

(*a*) *Sheran's Handbook of Literary Criticism.*

[Three hours a week for fourteen weeks.]

(*b*) ESSAY AND ORATION. Intensive study

[Three hours a week for twelve weeks.]

(*a*) *Sears' Methods and Principles of Criticism.*

[Three hours a week for ten weeks.]

Practice in writing in all literary forms and assigned readings.

II.

(*a*) *Sheran's Handbook of Literary Criticism.*

[Two hours a week for fourteen weeks.]

(*b*) Catholic Authors.

[One hour a week for fourteen weeks.]

(*c*) POETRY AND THE POETS. Texts, theory and critical study. *Page's American and English Poets. Corson's A Primer of Verse.*

[Three hours a week for twenty-two weeks.]

Practice in writing in all literary forms and assigned readings.

BUSINESS ETHICS.

I.

In this course is given descriptions of a system of bookkeeping suited to the needs of an architect's business, a system of building accounts, filing systems for catalogue and prints, a card index system for prints and general information; of forms for agreements with clients, for proposals and acceptances, for contracts and bonds, and for certificates; the laws affecting clients, contractors and architects; and the rules of professional ethics in private practice, competitions and municipal affairs.

Instruction is by text-book and lectures.

Text-book, *Wait.*

[Two hours a week for one term.]

ENGINEERING.

I.

DESCRIPTIVE GEOMETRY. In this course are considered problems on the point, right line, and plane; single curved, double curved, and warped surfaces; problems relating to tangent planes, to single curved, double curved, and warped surfaces; intersection of surfaces; spherical projections; orthographic, stereographic, globular, cylindrical, and conic projections; construction of maps, shades and shadows; linear perspective; isometric projections; theory and plates. Numerous practical problems and exercises requiring the application of the principles of Descriptive Geometry, are added by the instructor. Text-book, *Church.*

[Three hours a week for two terms.]

II.

SURVEYING. This course comprises the whole theory of land surveying and leveling; the use and adjustment of the transit, compass, level, and plane table; methods of measuring; relocations of boundaries; supplying omissions; obstacles to measurement; computations; field notes and plots; laying out land; parting off land; dividing up land; public lands survey. Text-book, *Gillespie.*

[Five hours a week for one term.]

III.

SURVEYING. Field practice and application of theory; adjustment and use of instruments in the field; solution of problems in the field, the theory of which is taught in the class room; practice in keeping field notes; computation and plots. [Five hours a week for six weeks.]

VIII.

ANALYTIC MECHANICS. The aim of this course is to prepare students of engineering for the study of the courses of applied mechanics. The course comprises a study of the fundamental principles of statics, kinematics, and kinetics. The subjects selected are studied with the object of thoroughly preparing the engineering students to pursue the technical and practical branches of their respective courses. Some of the topics considered in this course are: work, energy, conservation of energy; power, composition and resolution of forces, center of gravity, center of mass, moment of inertia, acceleration, dynamics of rigid bodies, laws of friction, etc. Text-book, *Ziwet.*

[Five hours a week for first term. Two hours a week for second term.]

X.

MECHANICS OF MATERIALS. This course is intended to meet the requirements of engineering students, and to prepare them, by a study of the action and effect of forces on beams and structures, to design economically and intelligently the parts entering into a complete structure. The course comprises a study of the elastic and ultimate deformation of the materials of engineering, their properties and methods of testing, and discussion of cases of simple stresses. The general theory of beams including cases of simple and cantilever beams, overhanging, fixed, and continuous beams, is thoroughly investigated. Columns are examined according to Euler's, Rankine's and other formulae and results compared. Some of the other sub-

jects considered in this course, are torsion of shafts, the transmission of power by shafts, apparent combined stresses, such as flexure and compression, flexure and torsion, etc. Compound columns and beams, reinforced concrete beams, plate girders and other forms. Then is studied the subjects, resilience and work, impact and fatigue, true internal stresses, centrifugal tension and flexure, unsymmetric loads on beams,—the course closing with a study of the mathematical theory of elasticity. Text-book, *Merriman.*

[Three hours a week for one term.]

XIII.

Sanitary Engineering. This course is a study of the principles and methods of drainage and disposal of sewage in populous districts: shape, material and calculation of sewers; catchbasins, flushing and ventilation; separate and combined system compared; pollution of rivers; chemical precipitation; results and costs of purification; general municipal and domestic sanitation; inspection of neighboring work. Text-book, *Staley and Pierson.*

[Two hours a week for two terms.]

XIV.

Bridges and Roofs. This course comprises a study of the different systems of trussed bridges and roof trusses, and the calculation of the strains produced when loaded in any manner, the weight of the structure and the effect of wind included. Both graphical and analytical methods are used. Besides the various systems of trussed bridges, which are studied in detail, the plate girders, suspension bridges, cantilever bridges, draw bridges, and roofs of various designs are given equal attention; the purpose being to familiarize the student with the different forms and enable him to design and to estimate the cost of construction. Text-book, *Merriman.*

[Five hours a week for one term.]

XV.

GRAPHIC STATICS. This course teaches the determination of stresses in framed structures by the graphical method. Shearing forces, bending moments, centers of gravity, and moments of inertia are graphically determined by the application of the principles of the force and equilibrium polygons; also the determination of stresses in bridge trusses with parallel chords and with broken chords, caused by uniform loads and locomotive wheel loads: graphical determination of stresses in roof trusses, graphical treatment of the arch, symmetrical and unsymmetrical cases, graphical methods of arch-ribs of hinged ends, and of fixed ends; stress diagrams; temperature stresses; braced arches; graphics applied to continuous girders. This course is supplemented by full explanations, notes, examples, and problems. Text-book, *Merriman.*

[Five hours a week for one term.]

GRAPHICS

I.

An elementary study of graphic statics. Forces, resultants; center of gravity, moment of inertia; buttresses; beams; truss loadings under snow and wind; truss construction. For students in Design Program.

Instruction by text-book and lectures.

Text-book, *Kidder Vol. III, Ricker, Sondericker.*

[Two hours a week for two terms.]

MATHEMATICS.

I.

ALGEBRA. This course includes a study of the binomial thereom, the theory of logarithms, choice, chance, variables and limits, series, determinants. Then follows a thorough study of the general properties and solution of equations, embracing the subjects of derivatives, transformation, detached coefficients, surd and imaginary roots, incommensurable roots, limits of roots, bi-quadric equations, Des Cartes' and Cardan's rules; Sturm's theorem; Horner's method. Text-book, *Wentworth.*

[Five hours a week for one term.]

II.

ANALYTIC GEOMETRY. This course includes a study of the point and right line; conic sections; their equations and properties; discussion of the general equation of the second degree containing two variables, different systems of coordinates; transformation of coordinates; an elementary course in geometry of three dimensions, embracing the point, straight line, plane and spherical surfaces of revolution; transformation of coordinates; quadric surfaces and supplementary propositions. Text-book, *Bailey and Woods.*

[Five hours a week for one term.]

III.

CALCULUS, DIFFERENTIAL. This course as also Courses IV. and V. is designed to meet the requirements of Engineering students. It includes a study of the methods for the differentation of algebraic, logarithmic and exponential, trigonometric, and inverse trigonometric functions, successive differentiation, and differential coefficients; treatment of implicit and compound functions; expansion of functions; indeterminate forms; partial differential coefficients of the first order and of higher orders; direction of curvature; radius of curvature; envelopes; maxima and minima of functions of one independent variable, and of several independent variables; tracing curves; differentials af arcs, plane areas, surfaces and volumes of revolution. Text-book, *Osborne.*

[Five hours a week for one term.]

IV.

CALCULUS, INTEGRAL. Integration of elementary form and of rational fractions; integration by rationalization and by parts; successive integration; multiple integrals; definite integrals, limits of integration; double integration applied to plane areas; rectification of plane curves; quadratures of plane areas and surfaces of revolution; surface and volume

of any solid; intrinsic equation of a curve. This course is supplemented by numerous exercises and examples. Text-book, *Osborne.*

[Five hours a week for three months.]

V.

Differential Equations. An elementary course for Engineering students, supplementary to the course of integral calculus. It embraces equations of the first order and first degree: equations of the first order, but not of the first degree; singular solutions; linear equations with constant coefficients; special forms of equations with higher orders. Numerous applications to mechanics and physics are introduced during the course. Text-book, *Murray.*

[Five hours a week for six weeks.]

PHYSICS.

II.

General Physics. In this course there is a more extended treatment of the same subjects than is given in Course I. Mathematical principles are applied to physical phenomena. Special attention is paid to accuracy in the mathematical work and in the statements of the principles involved. Lectures and recitations. Text-book, *Crewe.*

[Three hours a week for two terms.]

III.

Physical Problems. The application of mathematics in physical work. Measurements of length, mass and time. Work in mechanics, heat, light, sound, electricity and magnetism. The work is done in the laboratory and the student is taught to depend on his own resources and to check his results.

[Two laboratory hours a week for two terms.]

Series V Number 3

BULLETIN

of the

University of Notre Dame

NOTRE DAME, INDIANA

COLLEGE OF ARCHITECTURE

PUBLISHED QUARTERLY AT NOTRE DAME

THE UNIVERSITY PRESS
JANUARY, 1910

Entered at the Postoffice, Notre Dame, Indiana, as second class matter, July 17, 1905

DIRECTORY OF THE UNIVERSITY.

The FACULTY—Address:

THE UNIVERSITY OF NOTRE DAME,

NOTRE DAME, INDIANA.

The STUDENTS—Address:

As for the Faculty, except that the name of the HALL in which the student lives should be added.

A Postoffice, a Telegraph Office, a Long Distance Telephone, and an Express Office are at the University.

The University is two miles from the city of South Bend, Indiana, and about eighty miles east of Chicago. The Lake Shore and Michigan Southern, the Grand Trunk, the Vandalia, the Indiana, Illinois & Iowa, the Chicago and Indiana Southern, and the Michigan Central railways run directly into South Bend.

BOARD OF TRUSTEES.

VERY REV. ANDREW MORRISSEY, C. S. C.,
PRESIDENT.

REV. JOHN CAVANAUGH, C. S. C.,
CHANCELLOR.

REV. DANIEL E. HUDSON, C. S. C.,

REV. WILLIAM R. CONNOR, C. S. C.,
SECRETARY.

REV. JOSEPH A. MAGUIRE, C. S. C.

BRO. ALBEUS, C. S. C.,
TREASURER.

EXECUTIVE OFFICERS OF THE UNIVERSITY

REV. JOHN CAVANAUGH, C. S. C.,
PRESIDENT.

REV. THOMAS CRUMLEY, C. S. C.,
VICE-PRESIDENT.

REV MATTHEW SCHUMACHER, C. S. C.,
DIRECTOR OF STUDIES.

REV. TIMOTHY R. MURPHY, C. S. C.,
PREFECT OF DISCIPLINE.

BRO. ALBAN, C. S. C.,
SECRETARY.

PROFESSORS AND INSTRUCTORS IN THE COLLEGE.

Rev. THOMAS A. CRUMLEY, C. S. C.,
Philosophy.

Rev. JOSEPH MAGUIRE, C. S. C.,
Chemistry and Mineralogy.

Rev. MICHAEL QUINLAN, C. S. C.,
English.

Rev. LEONARD CARRICO, C. S. C.,
English.

Rev. MATTHEW WALSH, C. S. C.,
Political Economy.

Rev. THOMAS J. IRVING, C. S. C.,
Physics.

Rev. JOSEPH P. BURKE, C. S. C.,
Sociology, History.

ROLLAND ADELSPERGER, A. B., B. S. A.,
Architecture.

JAMES F. EDWARDS, A. M., LL. B.,
Librarian.

MARTIN J. McCUE, M. S., C. E.,
Mechanics.

FRANCIS WYNNE KERVICK, B. S. in Arch.,
Architecture.

FRANCIS XAVIER ACKERMANN, M. S.,
Mechanical Drawing.

JEROME J. GREEN, M. E., E. E.,
Electrical Engineering.

WILLIAM LOGAN BENITZ, M. E., E. E.,
Mechanical Engineering.

EDWARD J. MAURUS, M. S.,
Mathematics.

GALLITZIN FARABAUGH, A. B., LL. B.,
Law.

JOHN WORDEN, B. S.,
Freehand Drawing, Modeling.

WILLIAM B. KELLEY,
Shopwork.

CHARLES PETERSEN, A. M.,
German.

DOLOR PARENT,
French.

UNIVERSITY OF NOTRE DAME.

The University of Notre Dame was founded in the year 1842, by the Very Reverend Edward Sorin, the late Superior General of the Congregation of Holy Cross. In an act approved January 15, 1844, the Legislature of Indiana gave the University power to grant degrees. The beginning of this act is:

"Be it enacted by the General Assembly of the State of Indiana, that Edward Frederick Sorin, Francis Lewis Cointet, Theophilus Jerome Marivault, Francis Gouesse and their associates and successors in office, be, and are hereby constituted and declared to be, a body corporate and politic, by the name and style of the 'University of Notre Dame du Lac,' and by that name shall have perpetual succession, with full power and authority to confer and grant, or cause to be conferred and granted such degrees and diplomas in the liberal arts and sciences, and in law and medicine, as are usually conferred and granted in other universities in the United States, provided, however, that no degree shall be conferred or diplomas granted, except to students who have acquired the same proficiency in the liberal arts and sciences, and in law and medicine, as is customary in other universities in the United States.'

COLLEGE OF ARCHITECTURE

Architecture is, fundamentally, a fine art; but it is a fine art that may be expressed on so large a scale that a deep and comprehensive knowledge of engineering science is necessary to make its expression stable.

The Master-Artist is the heaven-gifted man who, having conceived his projects in ultimate beauty of form, color, texture, and ornament, can build them structurally and economically perfect. It is seldom that any mind combines all of these attributes. It is more seldom that to-day's practice requires them in any one man. To-day, one man "designs"; another "frames."

It is the recognition of these two almost independent phases of Architecture that has caused the University of Notre Dame to detach the Program in Architecture from the College of Engineering and to create the new College of Architecture.

The Faculty of the College now offer a short course program, three undergraduate programs and two graduate programs to men able to furnish the entrance requirements.

The Short Program covering two years is designed for students finding it impossible or inexpedient to devote to school work the time required for completing the programs leading to degrees. Upon completion of the Short Program a Certificate of Proficiency is given.

The two Design Programs ordinarily require four years for completion. These programs are identical, except that one major course in one is English, with various electives in the third and fourth years, and in the other the major is Mathematics. They are offered to students wishing to

specialize in design. The degree of Bachelor of Science in Architecture is given at completion. The Engineering Program is of the same length and is offered to men wishing to specialize in construction. The degree of Bachelor of Science in Architectural Engineering is given at completion.

Graduate years are offered in both programs, and upon completion, Master's degrees are conferred.

In the fourth year and in the Short Program, the classroom requirements are less and the time to be spent in the draughting-room correspondingly lengthened.

Students matriculating for the Short Program or any of the four-year programs must be at least eighteen years of age and must have completed the studies preparatory to architecture either in the Preparatory Department of the University or in another accredited school; or, entrance may be by examination, at the University on the first two days of the fall term, or in Chicago at the offices of the University on days announced in the press of that city.

Students may not matriculate with more than one condition; and any condition interfering with the routine of the courses must be worked off privately.

For students matriculating with advanced standing there must be a corresponding increase in the age limit.

Students taking the work of either of the graduate years must have received their Bachelor degree in Architecture or in Architectural Engineering from Notre Dame or another School of Architecture of equal standing. The University will confer the Master's degree on her own graduate students not in residence at the end of one year if that time is spent in an *atelier* of the first order or in travel abroad following an approved curriculum of study and investigation; or at the end of not less than two years if that time is spent in practice and the requirements of the University are complied with.

The equipment of the College of Architecture, from a small beginning, is rapidly becoming more and more complete. There are a number of signed drawings—some from the *Ecole de Beaux-Arts,* others from architects of national reputation; a large elaborate model of the Cook County Court House, Chicago; photographs, engravings, plaster models, reference books and manufacturers' catalogues and samples. The collection, however, needs to be increased faster than the resources of the University will permit. Philanthropic friends of Notre Dame can not give money, or its equivalent, for a better purpose. The endowment of a Traveling Fellowship, preferably for the study of European Ecclesiastical Architecture, will be a benefaction of the utmost value. One thousand dollars will provide for one man for one year.

ENTRANCE REQUIREMENTS.

Candidates for the First Year in any four-year program, or for the First Year of the Short Program* must be prepared to pass an examination in the branches named below, unless they have done their preparatory work at Notre Dame or in an accredited High School or Preparatory School of equal rank.

ENGLISH. Part of the examination is given for answering questions upon the text-books and readings required in the preparatory courses in English; the remainder for writing an essay.

---

* Draftsmen, of twenty-two years of age or older, of not less than two years' experience, and others as well qualified, may take up the work of the Short Program without examination.

ALGEBRA. Fundamental operations, simple equations, involution and evolution, radicals, radical equations and quadratic equations, including everything up to logarithms, as given in *Wentworth's College Algebra,* or of an equivalent in the larger treatises by other authors.

GEOMETRY. Plane and Solid.

TRIGONOMETRY. Plane and Spherical.

HISTORY. A general knowledge of the outlines of Greek and Roman History and of Medieval and Modern history, as set forth in the texts used in the high schools and academies of the country.

CHEMISTRY. Elements of inorganic chemistry, as given in high schools of good standing. Laboratory work is also required.

PHYSICS. Elementary. The preparation on this subject should include a course of lectures illustrated by experiments, and recitations from a text book similar to *Carhart and Chute's* or *Gage's.* Laboratory work is also required.

CIVICS. Elementary.

FRENCH. A three years' course in French is required. Ability to translate at sight French into English, and easy English sentences into French.

GERMAN. An equivalent course in German or any other language may be offered for French.

DRAWING. A knowledge of the use of drawing instruments, of projection drawing and elementary freehand.

THE DESIGN PROGRAMS.

DEGREE: Bachelor of Science in Architecture
Master of Science in Architecture

It has been the aim of the College in offering the first design program to so plan it that the student will have upon completion a general liberal education, a practical working knowledge of Construction, and a systematic and thorough training in Architectural Design and Composition. It may be undertaken by students whose artistic intuition and temperament fit them especially for the aesthetic side of a noble profession.

It follows essentially the course of study planned by the American Institute of Architects, as outlined in the yearly reports of its Committee on Education.

The second program is offered for the convenience of students who desire to specialize in Mathematics rather than in English, or who have advanced standing for work done at other schools and who wish to complete the work leading to a degree at Notre Dame.

The programs are built up around the work in the draughting-room and *atelier,* where half of the student's time is spent. The work in Design, beginning in the first year with the intelligent study of the Orders and simple problems involving their combination and use, and continued in the three following years by means of minor and major problems involving the planning of all classes of buildings from the simplest to the most monumental, is supplemented and rounded out by exercises in the various methods and media of rendering and by a thorough course in freehand drawing and modeling. All instruction in planning and composition is based on accepted principles of design.

The materials and methods of all trades and professions engaged in building operations are systematically studied in the Construction classes throughout the four years of the program. The writing of specifications for each branch of labor is studied synchronously. Practical work in the various trades is given so that the student may know good work and thus be able to superintend construction intelligently. The practical lessons are supplemented by regular inspection trips to the important building operations and industries in the neighborhood of the University, and by an annual visit to Chicago of three or four days' duration, always made during the time of the Chicago Architectural Club's annual exhibit. Last year the classes saw the making of steel at the U. S. Steel Corporation's immense new plant, at Gary, Indiana; of cement at the Universal Portland Cement Co.'s Buffington plant; of architectural terra cotta at the Northwestern Terra Cotta Co.'s works, and of wrought iron and bronze at the Winslow Bros. Co.'s works. The Chicago trip is part of the required work.

The standard hand-books and mill-books are used as supplementary text-books.

Graphic methods of determining stresses in beams, girders and trusses of all forms are studied and numerous practical problems are solved.

Working drawings and details of construction are made under office conditions.

Broadly speaking, it is the purpose of the College in outlining the construction courses to equip the student to solve by *office methods* any problem he may meet in ordinary practice, it being taken for granted that graver problems requiring a deep knowledge of the higher mathematics may well be left to the architectural engineer.

In the last year of the program a series of lectures are given on estimates, contracts, law, business relations, and professional ethics and practice. Architects of high professional standing will give a number of the lectures in this course.

The history of architecture and of the allied arts is studied in a course covering four years. The method is a combination of lectures, recitation and research.

On the Chicago trip, a day is always spent visiting the Egyptian and Roman antiquities at the Field Museum, and the collection of paintings, sculpture and architectural casts at the Art Institute.

Courses either in mathematics or in English (with Electives as noted below) covering four years complete the curriculum.

In the Graduate Year advanced work in criticism and research is done and larger and more complicated problems are given in design.

THE ENGINEERING PROGRAM.

DEGREES: Bachelor of Science in Architectural Engineering
Master of Science in Architectural Engineering

The science of Engineering has long since outgrown the practical limit of one man's abilities. To be thorough, the Engineer must specialize. One of his specializations is in Architecture. His services are needed to frame important buildings, to design their foundations and to protect adjoining property while they are in erection. The College offers the Program in Architectural Engineering because there is need of the services of the men who can complete it.

Students desiring to become Architectural Engineers should have a bent for Mathematics and for painstaking, exact draughting.

The program of studies differs from that of the first Design Program, chiefly in the following particulars:

Courses in pure and applied Mathematics are substituted for the courses in English, Economics and Philosophy; the more important Construction courses go deeper into theory; Freehand work ends with the second year; the study of Historic Ornament and the Histories of the "allied arts" omitted; and a relatively greater amount of time, increasing each year, is spent on structural design.

The Graduate Year is spent entirely in solving problems of the first order in Architectural Engineering.

THE SHORT PROGRAM.

Certificate of Proficiency.

Many ambitious men, who wish to follow the profession of Architecture, find themselves unable to devote the time needed to obtain a degree; other men, who have worked as draftsmen in architect's offices, see the necessity of an education on broader lines. The Short Program is designed to meet the needs of these men. It covers a great deal of the purely architectural work of the four-year Programs. And while it comprises such elementary work as the Orders, Perspective, Shades and Shadows, the College Faculty will gladly substitute for that additional time in Design.

Candidates for the Certificate may, if proficient in other courses, substitute for them equivalent additional work from the four-year Programs.

SUMMER WORK.

Summer, or Vacation Work, consisting of sketches, projects, measured drawings or work in an Architect's office will be required of all students of Architecture.

EXPLANATION OF "HOURS."

A class hour means one hour of recitation or lecture and one to two hours of preparation.

A freehand or design hour means two actual hours in the drafting-room. There is a specified amount of work to accomplish for which credit points are given at completion. The drafting-room is open all day and is always occupied. It is desired to have the student work there steadily five hours a day. The average student can complete his work in that time.

PROGRAM IN DESIGN.

FIRST YEAR.

SUBJECTS First Term	Hours a Week	See for Description Page	See for Description Course	SUBJECTS Second Term	Hours a Week	See for Description Page	See for Description Course
English	3	26	I	English	3	26	I
El. of Arch.	8	22	I	El. of Arch.	8	22	I
Construction	4	19	I	Construction	4	19	I
Hist. of Arch.	2	18	I	Hist. of Arch.	2	18	I
Drawing	2	25	Ic	Drawing	2	25	Id
Des. Geom. Shades and Shadows	1	24	III	Perspective	1	24	III

SECOND YEAR.

English	3	26	II	English	3	26	II
Design	8	22	II	Design	8	22	II
Construction	3	20	II	Construction	3	20	II
Hist. of Arch.	2	18	II	Hist. of Arch.	2	18	II
Drawing	2	25	IIa	Drawing	2	25	IIa
Graphics	2	30	I	Graphics	2	30	I
The'y of Des.	1	22	VII				

THIRD YEAR.

Elective	4			Elective	4		
Design	8	22	III	Design	8	22	III
Construction	1	20	III	Construction	1	20	III
Hist. of Ornament	2	18	III	Hist. of Sculpture	2	18	IV
Drawing	2	25	IIb	Pen and Ink	1	26	VII
Heat and Ventilation	2	21	V	Water Color	1	26	V
				Sanitation	2	21	VI
Electricity	1	21	VII	Church Des.	1	23	VIII

FOURTH YEAR.

Elective	4			Elective	4		
Hist. of Painting	2	19	V	Bus. Ethics	2	27	I
Drawing	1	25	III	Modeling	2	25	IV
Drawing	1	26	VI	Design (Thesis)	10	22	IV
Design	10	22	IV				

At the beginning of the First Year the student matriculating for the Program in Design may, with the consent of the Faculty, elect a Major in Mathematics instead of the Major in English. The Mathematics courses for the four years will be as follows: Algebra, I; Analytic Geometry, II; Calculus, III, IV, V; Physics, II, III; Analytic Mechanics, VIII; Mechanics of Materials, X.

At the beginning of his Third Year, the student following the regular Program in Design may, if his proficiency in English warrants it, elect to follow during the Third and Fourth Years one of the following courses: English, Philosophy, Political Science, History, French or German. He may not, however, elect a course in the same language that he offered for credit at matriculation. If the above election is denied the student, he must continue his work in English for one or two years more as may decided by the Faculty.

PROGRAM IN ARCHITECTURAL ENGINEERING.

FIRST YEAR.

SUBJECTS First Term	Hours a Week	See for Description Page	Course	SUBJECTS Second Term	Hours a Week	See for Description Page	Course
Algebra	5	30	I	Anal. Geom.	5	31	II
Des. Geom.	3	27	I	Des. Geom.	3	27	I
Construction	4	19	I	Construction	4	19	I
Shades and Shadows	1	24	III	Perspective	1	24	III
Drawing	1	24	I	Drawing	1	24	II
Drawing	1	25	Ic	Drawing	1	25	Id
El. of Arch.	8	22	I	El. of Arch.	8	22	I

SECOND YEAR.

Calculus	5	31	III	Calculus	5	31	IV,V
Physics	5	32	II,III	Physics	5	32	II,III
Construction	4	20	II,III	Construction	4	20	II,III
Design	7	22	II	Design	2	25	II
Drawing	2	25	IIa	Drawing	7	22	IIa
Theory of Design	1	23	VII				

THIRD YEAR.

Anal. Mechan.	5	28	VIII	Anal. Mech.	2	28	VIII
Sanitary Eng.	2	29	XIII	Mechanics of Mat'ls	3	28	X
Electricity	1	21	VII	San't'ry Eng.	2	29	XIII
Heating and Ventilating	2	21	V	Surveying	3	27	II,III
Hist. of Arch	2	18	I	Hist. of Arch.	2	18	I
Struc. Design	8	23	V	Struct. Des.	8	23	V

FOURTH YEAR.

Arch. Eng.	2	20	IV	Arch. Eng.	3	20	IV
Bridges and Roofs	5	29	XIV	Graphics	5	30	XV
Stereotomy	3	24	VI	Hist of Arch.	2	18	II
Hist. of Arch.	2	18	II	Bus. Ethics	2	27	I
Struct. Design	8	23	VI	Struct. Des. (Thesis)	8	22	VI

SHORT PROGRAM.

FIRST YEAR.

SUBJECTS First Term	Hours a Week	See for Description Page	Course	SUBJECTS Second Term	Hours a Week	See for Description Page	Course
Hist. of Arch.	2	18	I	Hist. of Arch.	2	18	I
Construction	4	19	I	Construction.	4	19	I
Des. Geom.			III	Perspective	1	24	III
Shades and Shadows	1	24		Drawing	1	25	Id
				Pen and Ink	1	26	VII
Drawing	1	25	Ic	El. of Arch.	4	22	XV
El. of Arch.	12	22	I	Design	8	22	II
				Theory of Des.	1	23	VII

SECOND YEAR.

Hist. of Arch.	2	18	II	Hist. of Arch.	2	18	II
Construction	4	20	II,III	Construction.	4	20	III
Graphics	2	30	I	Graphics	2	30	I
Heat. and Ventilation	2	21	V	Sanitation	2	21	VI
					1		
Electricity	1	21	VII	Bus. Ethics	2	27	VI
Water Color	1	26	V	Drawing	4	25	IIa
Drawing	4	25	IIa	Modeling	2	25	IV
Design	8	22	III	Design	8	22	III
					1	23	VII

COURSES OF INSTRUCTION

ARCHITECTURE.

I AND II.

HISTORY OF ARCHITECTURE. This course includes a study of history, manners, customs, politics and religion as well as of the Architecture of Egypt, Assyria, Greece and Rome. It takes up the rise and development of Christianity and the Christian types—Basilican, Romanesque; Byzantine and its Mohammendan offshoots; Gothic and Renaissance in all their phases. Some attention is paid to Indian, Chinese and Japanese styles. A comprehensive review is made of American work. In seminar the course is completed by a study and discussion of the various phases of "The New Art", both abroad and in the United States.

Instruction is by text-book, lectures, readings and research.

Text-book, *Hamlin, Sturgis.*

[Two hours a week for four terms.]

III.

HISTORIC ORNAMENT. A study of the origin and evolution of all styles of ornament, and of its application to architectural forms, appurtenances and objects of art.

Instruction by text-book, lectures, readings, and drawings in various media.

In drawing fifteen plates are required.

Text-book, *Glazier.*

[Two hours a week for one term.]

IV.

HISTORY OF SCULPTURE. A brief historical review of ancient and modern sculpture.

Instruction by text-book, conference and research.

Text-book, *Marquand and Frothingham.*

[Two hours a week for one term.]

V.

HISTORY OF PAINTING. A brief historical and critical review of Painting.

Instruction by text-book, conference and research.

Text-book, *Van Dyke.*

[Two hours a week for one term.]

CONSTRUCTION.

I.

In this course the student obtains a thorough knowledge of the materials and methods of masonry, carpentry, roofing, metal-working, painting. Each trade is considered separately, and at conclusion an exhaustive study of specification writing and methods of estimating for it is made. Detail drawings of constructive methods are made exactly as in an architect's office.

In the spring terms of his last three years each student is required to stake out on the campus one of his projects and to furnish all levels required by the builder in order to acquire thoroughness in the use of the architect's level and compass.

The University constantly furnishes employment to a large force of trained mechanics who will give personal lessons to the student in all branches of these trades. Inspection visits are made regularly, as a supplementary exercise in superintendence, to important building operations in the neighborhood.

Instruction is by text-books and lectures.

Fifteen points must be made in inspections and drawings.

Text-books, *Kidder's Building Construction Vols. I, II; Kidder's Handbook.* Supplementary, *Sweet's Index.*

[Four hours a week for two terms.]

II.

A thorough study of foundation work—caissons, piles, grillage, spread and stepped footings; fire proofing of all forms; the design and construction of steel framing.

Working drawings for one of the student's projects are made. Especial care and accuracy are demanded in the preparation of the framing plans and details. This work is traced and blue-printed by First Year students.

Instruction is by text-books and lectures. Eight points must be made in inspections and drawing.

Text-books, *Kidder,* Vol. I; *Frietag;* Supplementary—*Sweet's Index, Carnegie* and *Bethlehem "Millbooks."*

[Three hours a week for two terms.]

III.

A study of Reinforced Concrete; Elevators; Power plants for buildings.

Instruction by text-book and lectures.

Five points must be made in inspections and drawings.

Text-books, *Watson;* Supplementary, *Sweet's Index,* Concrete Handbooks.

[One hour a week for two terms.]

IV.

Architectural Engineering. A course in which the student is taught to solve graphically and analytically more complicated problems in structural design and applied mechanics. Shoring, underpinning, retaining walls, jointed trusses, arches, vaults and domes are the more important topics.

Instruction is by text-book. Twelve points must be made in inspections and drawing.

Text-books, *Kidder, Vols. I, III; Wittmann.*

[Two hours a week for one term, three hours a week for one term.]

V.

HEATING AND VENTILATION. This course is a study of the theory and practice of heating and ventilating public buildings and dwelling houses. The different systems of heating,—furnace heating, hot water, steam, etc.,—are carefully examined and studied. The radiation of heat from surfaces, the different systems of piping, condition of air as to moisture, amount of air required, causes and best means adopted to secure pure air; the necessity of good ventilation and the latest approved methods for securing this are some of the topics considered in this study.

Instruction by text-book and lectures.

Text-book, *Carpenter.*

[Two hours a week for one term.]

VI.

SANITATION. The following are topics covered in this course: The carrying away of surface water and wastes from the building; pipes and fittings; one and two-pipe roughing-in systems; traps; domestic water supplies; pumping engines; heating of water for domestic purposes; plumbing fixtures.

Instruction is by text-book and lectures.

Text-book, *Cosgrove.*

[Two hours a week for one term.]

VII.

ELECTRICITY. Laboratory and lectures on the uses of electricity in buildings, systems of wiring, materials used, the underwriters' requirements, study of bells, telephones, electric lighting, photometry and illumination.

[One hour a week for two terms.]

DESIGN.

I.

ELEMENTS OF ARCHITECTURE. This is a course of drawing. Thirty-two plates of standard size (or their equivalent) will be made during the year. They will consist of measured drawings of the Roman and Greek orders, of the various details associated with them and of simple problems involving their use; of lettering; of exercises in wash and color; and of studies in shades and shadows and perspective.

Each plate will be examined by the Professor in charge, and may be marked "Pass," "Mention," or "Highest Mention," counting ½, ¾ or 1 point, respectively. All plates must be drawn and at least fifteen points registered.

Instruction is by text-book.

Text-books, *Ware, von Mauch, McGoodwin.*

[Eight hours a week for two terms.]

II, III AND IV.

These courses are the most important on the program. In the solving of the problems the student makes use of every item of information that he has acquired in all his other class-work, for the aim of the instruction in design is, primarily, practicability. The planning is straight-forward, logical and direct;—the design is powerful, simple, and expressive. The method is criticism. The means are major and minor problems of varying degrees of difficulty varying from a masonry gate-post to the most monumental projects. These problems are stated in programs that are made definite and practical and as like actual conditions as possible. A recent problem was a public bath and reading room on an irregular shaped parcel of ground in the neighboring city. The students surveyed the ground before beginning the sketches.

Second year men are required to execute eight minor and eight major problems; third year men, eight minor and six

major problems; and fourth year men, four minor and three major problems and the thesis.

These designs are criticised by the Professor in charge, or by some able architect especially invited. They may be marked "Pass," "Mention," or "Highest Mention," counting ½, ¾ or 1 point respectively for minor problems, and 2, 3 or 4 points for major problems.

Fifteen points must be registered in second year design, as many in third year design, and eight in fourth year design before thesis work is started.

[Eight, eight and ten hours a week, respectively, for three years.]

V, VI.

Structural Design. These courses have the same relative importance as the courses in design. The analogy goes further, the work is given as major and minor problems of varying degrees of difficulty and is judged and marked in the same manner. The scope of the problems will vary from the making of an ordinary footing plan to the framing of the structural steel work of a large dome.

The amount of work and the points required to be registered is the same for the same year as given under *Design II, III, IV.*

[Eight hours a week for three years.]

VII.

Theory of Design. A thorough study of the principles of planning and proportion supplemented by study of the perfection and faults of the world's most famous buildings.

Instruction by text-book and lectures.

Text-book, *Robinson.*

[One hour a week for one term.]

VIII.

Church Design. This course is conducted by means of lectures and research. It includes the arrangement of sanctuaries, sacristies and baptisteries as affected by liturgical needs. The subject of church furniture and accessories is also discussed.

[One hour a week for one term.]

DRAWING, MECHANICAL.

I.

FREEHAND. This course consists of sketching with pencil and pen from flat copies and models and freehand lettering. Later in the term the use of instruments, section-lining and lettering are taught. Text-book, *Jamison's Elements.*

[Three hours a week for one term.]

II.

PROJECTION DRAWING. The course embraces the principles of projection, methods of shop-drawing, tinting, tracing, blue-printing, line-shading and the preparation of working drawings of complete machines. This course must be preceded by Course I. Text-book, *Jamison's Manual.*

[Three hours a week for one term.]

III.

DESCRIPTIVE GEOMETRY. A series of accurate plates is made, illustrating the principles of orthographic and spherical projections, shades and shadows, perspective and isometric projections.

[One hour a week for two terms.]

VI.

STEREOTOMY. This course comprises a study of the application of the principles of Descriptive geometry to the determination of the forms and sizes of the stones used in the construction of the different classes of arches and masonry structures. This course is given by lectures in the drawing room, explaining the construction of templates, and the use of directing instrument; also explanations of methods of drawing plans, elevation and development of oblique arches, wing walls and the like. A certain number of plates and drawings is required, illustrating the methods of performing practical work.

Drawing and designing plans, elevations and sections of masonry, construction, foundations, dams, piers, abutments, culverts and arches. Text-book, *French.*

[Three hours a week for one term.]

DRAWING, FREEHAND AND MODELING.

I.

(*a*) Drawing from casts of ornaments purely geometrical, such as mouldings, ovoloes, dentils, etc. Sketching from simple objects.

(*b*) Drawing from casts of ornaments of which the elements are living forms, such as ornamental leaves and flowers.

(*c*) Drawing from architectural elements, architectural ornaments such as pedestals, bases, shafts, cornices, etc.

(*d*) Drawing from casts of the human figure; hands, feet, masks, etc. Sketching from familiar objects.

ANTIQUE CLASS.

II.

(*a*) Drawing from the antique of heads and busts. Still life drawing. Sketches of landscapes from nature. Selection of a subject. Composition in landscape.

(*b*) Drawing from the antique, full figure. Occasional studies of the head from the living model. Sketching from the costumed model. Still life in water colors.

III.

Life Class. Drawing from life. Sketching from the costumed model. Still life painting in water colors. Landscape painting.

IV.

Modeling. The objects modeled are architectural forms copied from the cast or made from the student's drawings of his own work, as his progress and ability may warrant.

[Two hours a week for one term.]

V.

WATER COLOR. Drawing in water color from still life and nature.

[One hour a week for one term.]

VI.

RENDERING IN WATER COLOR. The rendering of architectural drawings, including perspectives,—casting of shadows, color treatments of buildings and handling of foreground and background.

[One hour a week for one term.]

VII.

PEN AND INK. Rendering drawings in pen and ink from studies by noted artists in this branch of art; followed by rendering of original drawings.

[One hour a week for one term.]

ENGLISH.

I.

(*a*) *Sheran's Handbook of Literary Criticism.*

[Three hours a week for fourteen weeks.]

(*b*) ESSAY AND ORATION. Intensive study

[Three hours a week for twelve weeks.]

(*a*) *Sears' Methods and Principles of Criticism.*

[Three hours a week for ten weeks.]

Practice in writing in all literary forms and assigned readings.

II.

(*a*) *Sheran's Handbook of Literary Criticism.*

[Two hours a week for fourteen weeks.]

(*b*) Catholic Authors.

[One hour a week for fourteen weeks.]

(*c*) POETRY AND THE POETS. Texts, theory and critical study. *Page's American and English Poets. Corson's A Primer of Verse.*

[Three hours a week for twenty-two weeks.]

Practice in writing in all literary forms and assigned readings.

BUSINESS ETHICS.

I.

In this course is given descriptions of a system of bookkeeping suited to the needs of an architect's business, a system of building accounts, filing systems for catalogue and prints, a card index system for prints and general information; of forms for agreements with clients, for proposals and acceptances, for contracts and bonds, and for certificates; the laws affecting clients, contractors and architects; and the rules of professional ethics in private practice, competitions and municipal affairs.

Instruction is by text-book and lectures.

Text-book, *Wait.*

[Two hours a week for one term.]

ENGINEERING.

I.

DESCRIPTIVE GEOMETRY. In this course are considered problems on the point, right line, and plane; single curved, double curved, and warped surfaces; problems relating to tangent planes, to single curved, double curved, and warped surfaces; intersection of surfaces; spherical projections; orthographic, stereographic, globular, cylindrical, and conic projections; construction of maps, shades and shadows; linear perspective; isometric projections; theory and plates. Numerous practical problems and exercises requiring the application of the principles of Descriptive Geometry, are added by the instructor. Text-book, *Church.*

[Three hours a week for two terms.]

II.

SURVEYING. This course comprises the whole theory of land surveying and leveling; the use and adjustment of the transit, compass, level, and plane table; methods of measuring; relocations of boundaries; supplying omissions; obstacles to measurement; computations; field notes and plots; laying out land; parting off land; dividing up land; public lands survey. Text-book, *Gillespie.*

[Five hours a week for one term.]

III.

SURVEYING. Field practice and application of theory; adjustment and use of instruments in the field; solution of problems in the field, the theory of which is taught in the class room; practice in keeping field notes; computation and plots. [Five hours a week for six weeks.]

VIII.

ANALYTIC MECHANICS. The aim of this course is to prepare students of engineering for the study of the courses of applied mechanics. The course comprises a study of the fundamental principles of statics, kinematics, and kinetics. The subjects selected are studied with the object of thoroughly preparing the engineering students to pursue the technical and practical branches of their respective courses. Some of the topics considered in this course are: work, energy, conservation of energy; power, composition and resolution of forces, center of gravity, center of mass, moment of inertia, acceleration, dynamics of rigid bodies, laws of friction, etc. Text-book, *Ziwet.*

[Five hours a week for first term. Two hours a week for second term.]

X.

MECHANICS OF MATERIALS. This course is intended to meet the requirements of engineering students, and to prepare them, by a study of the action and effect of forces on beams and structures, to design economically and intelligently the parts entering into a complete structure. The course comprises a study of the elastic and ultimate deformation of the materials of engineering, their properties and methods of testing, and discussion of cases of simple stresses. The general theory of beams including cases of simple and cantilever beams, overhanging, fixed, and continuous beams, is thoroughly investigated. Columns are examined according to Euler's, Rankine's and other formulae and results compared. Some of the other sub-

jects considered in this course, are torsion of shafts, the transmission of power by shafts, apparent combined stresses, such as flexure and compression, flexure and torsion, etc. Compound columns and beams, reinforced concrete beams, plate girders and other forms. Then is studied the subjects, resilience and work, impact and fatigue, true internal stresses, centrifugal tension and flexure, unsymmetric loads on beams,—the course closing with a study of the mathematical theory of elasticity. Text-book, *Merriman.*

[Three hours a week for one term.]

XIII.

Sanitary Engineering. This course is a study of the principles and methods of drainage and disposal of sewage in populous districts: shape, material and calculation of sewers; catchbasins, flushing and ventilation; separate and combined system compared; pollution of rivers; chemical precipitation; results and costs of purification; general municipal and domestic sanitation; inspection of neighboring work. Text-book, *Staley and Pierson.*

[Two hours a week for two terms.]

XIV.

Bridges and Roofs. This course comprises a study of the different systems of trussed bridges and roof trusses, and the calculation of the strains produced when loaded in any manner, the weight of the structure and the effect of wind included. Both graphical and analytical methods are used. Besides the various systems of trussed bridges, which are studied in detail, the plate girders, suspension bridges, cantilever bridges, draw bridges, and roofs of various designs are given equal attention; the purpose being to familiarize the student with the different forms and enable him to design and to estimate the cost of construction. Text-book, *Merriman.*

[Five hours a week for one term.]

XV.

GRAPHIC STATICS. This course teaches the determination of stresses in framed structures by the graphical method. Shearing forces, bending moments, centers of gravity, and moments of inertia are graphically determined by the application of the principles of the force and equilibrium polygons; also the determination of stresses in bridge trusses with parallel chords and with broken chords, caused by uniform loads and locomotive wheel loads: graphical determination of stresses in roof trusses, graphical treatment of the arch, symmetrical and unsymmetrical cases, graphical methods of arch-ribs of hinged ends, and of fixed ends; stress diagrams; temperature stresses; braced arches; graphics applied to continuous girders. This course is supplemented by full explanations, notes, examples, and problems. Text-book, *Merriman.*

[Five hours a week for one term.]

GRAPHICS

I.

An elementary study of graphic statics. Forces, resultants; center of gravity, moment of inertia; buttresses; beams; truss loadings under snow and wind; truss construction. For students in Design Program.

Instruction by text-book and lectures.

Text-book, *Kidder Vol. III, Ricker, Sondericker.*

[Two hours a week for two terms.]

MATHEMATICS.

I.

ALGEBRA. This course includes a study of the binomial thereom, the theory of logarithms, choice, chance, variables and limits, series, determinants. Then follows a thorough study of the general properties and solution of equations, embracing the subjects of derivatives, transformation, detached coefficients, surd and imaginary roots, incommensurable roots, limits of roots, bi-quadric equations, Des Cartes' and Cardan's rules; Sturm's theorem; Horner's method. Text-book, *Wentworth.*

[Five hours a week for one term.]

II.

ANALYTIC GEOMETRY. This course includes a study of the point and right line; conic sections; their equations and properties; discussion of the general equation of the second degree containing two variables, different systems of coordinates; transformation of coordinates; an elementary course in geometry of three dimensions, embracing the point, straight line, plane and spherical surfaces of revolution; transformation of coordinates; quadric surfaces and supplementary propositions. Text-book, *Bailey and Woods.*

[Five hours a week for one term.]

III.

CALCULUS, DIFFERENTIAL. This course as also Courses IV. and V. is designed to meet the requirements of Engineering students. It includes a study of the methods for the differentation of algebraic, logarithmic and exponential, trigonometric, and inverse trigonometric functions, successive differentiation, and differential coefficients; treatment of implicit and compound functions; expansion of functions; indeterminate forms; partial differential coefficients of the first order and of higher orders; direction of curvature; radius of curvature; envelopes; maxima and minima of functions of one independent variable, and of several independent variables; tracing curves; differentials af arcs, plane areas, surfaces and volumes of revolution. Text-book, *Osborne.*

[Five hours a week for one term.]

IV.

CALCULUS, INTEGRAL. Integration of elementary form and of rational fractions; integration by rationalization and by parts; successive integration; multiple integrals; definite integrals, limits of integration; double integration applied to plane areas; rectification of plane curves; quadratures of plane areas and surfaces of revolution; surface and volume

of any solid; intrinsic equation of a curve. This course is supplemented by numerous exercises and examples. Text-book, *Osborne.*

[Five hours a week for three months.]

V.

Differential Equations. An elementary course for Engineering students, supplementary to the course of integral calculus. It embraces equations of the first order and first degree: equations of the first order, but not of the first degree; singular solutions; linear equations with constant coefficients; special forms of equations with higher orders. Numerous applications to mechanics and physics are introduced during the course. Text-book, *Murray.*

[Five hours a week for six weeks.]

PHYSICS.

II.

General Physics. In this course there is a more extended treatment of the same subjects than is given in Course I. Mathematical principles are applied to physical phenomena. Special attention is paid to accuracy in the mathematical work and in the statements of the principles involved. Lectures and recitations. Text-book, *Crewe.*

[Three hours a week for two terms.]

III.

Physical Problems. The application of mathematics in physical work. Measurements of length, mass and time. Work in mechanics, heat, light, sound, electricity and magnetism. The work is done in the laboratory and the student is taught to depend on his own resources and to check his results.

[Two laboratory hours a week for two terms.]